

THE RELATIONSHIP BETWEEN AUTO OWNERSHIP AND EMPLOYMENT
OUTCOMES: RACE & GENDER VARIATIONS

by

Sara Ann Lichtenwalter

B.S. in Finance/Accounting, La Roche College, 1984

MSW in Community Organizing, University of Pittsburgh, 1997

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FACULTY OF SCHOOL OF SOCIAL WORK

This dissertation was presented

by

Sara Ann Lichtenwalter

It was defended on

April 28, 2005

and approved by

Gary Koeske, PhD

Morton Coleman, PhD

Kenneth Jaros, PhD

Hidenori Yamatani, PhD
Dissertation Director

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THE RELATIONSHIP BETWEEN AUTO OWNERSHIP AND EMPLOYMENT OUTCOMES: RACE AND GENDER VARIATIONS

Sara Ann Lichtenwalter, PhD

University of Pittsburgh, 2005

This dissertation presents an historical overview of the travel restraints on African Americans, females, and low-income people in the US, as well as the transportation policies that fostered these restraints. Subsequently, the study examines modern day restraints on mobility, and its relationship to employment outcomes, defined as earnings and hours employed. Several within subject comparisons and two ANOVAs confirmed the study's hypothesis that after controlling for education, work experience, and a variety of demographic characteristics, the NLSY participants, in the labor force throughout the decade from 1990 to 2000, encountered significantly less favorable employment outcomes when reporting an increased number of years without auto access. The ANOVA found this impact on earnings to be strongest among African Americans and females. The ANOVA on hours employed found this impact to be strongest on African American males, and all females parenting 5 or more years. African American females with the lowest levels of vehicle access reported the highest number of work hours among all black and white females, but nearly the lowest earnings.

Kain's Spatial Mismatch Theory and Sherraden's Theory of Welfare Based on Assets, along with the Work-Family-Fit model provide the theoretical framework for the respective macro and micro influences of transportation disadvantage on earnings and hours employed.

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1. INTRODUCTION

1.1. Social Work and Transportation Justice

Throughout history, travel and mobility advantage have resulted in unique opportunities for economic and social advancement (Fuller, 1929, Meyer & Gomez-Ibanez, 1981; Owen, 1964; World Bank, 1972). Restraints on female mobility and women's subsequent exclusion from such advancement opportunities is evident in early cultures from the centuries long practice of the Chinese's constraint of women's feet, to ancient Rome's ban on female chariot drivers (Scharff, 1991). However, perhaps the harshest example of such exclusion from opportunity by curtailment of travel liberties is evident in early America's institutionalized slavery and its subsequent era of Jim Crow. This study examines the remnants of these legacies that persist to the present day, through a racial and gender analysis of the relationship between transportation disadvantage and employment outcomes.

The National Association of Social Workers' *Code of Ethics* declares that attention to the environmental forces that create and contribute to the problems in living is fundamental to social work. In addition, the second most important ethical principal to which social workers adhere, as delineated in the *Code of Ethics*, is the pursuit of social change and the challenge of social injustice (NASW, 1999). Equity in travel and mobility remain as salient for contemporary economic outcomes in the US, as it has been in any period in history. Therefore, following an historical overview of the travel restraints of African Americans and low-income people in the US, as well as the transportation policies that fostered these restraints, this dissertation examines

modern day restraints on mobility and its relationship to employment outcomes, particularly as it relates to race and gender. However, first is a brief overview of the significance of the current disparities in auto ownership and the corresponding implications.

U.S. public investment and development patterns have produced metropolitan areas in which families must rely upon private vehicles to reach daily destinations such as jobs, stores, doctors and other amenities. The era of the model neighborhood, in which friends, family, school, groceries, and the pharmacy are within walking distance has passed, and in many contemporary residential areas sidewalks have vanished (Brabo, Kilde, Herriges, Quinn & Nordquist, 2003; STPP, 2002). In the last decade of the 20th century the number of kids walking to school declined 23 percent as the dependence on automobiles continued to rise (STPP, 2002).

Females, in their role as caregivers of young and old, are now society's primary chauffeurs and errand runners, and make more daily trips than men, with mothers making the most trips, over 20% more trips than men and the average woman (STPP, 2002). In addition, from economic necessity, mothers are now participating in the wage labor force in greater numbers than any time in history (Bureau of Labor Statistics, 2004).

Consequently, with these formidable travel demands the average household allocates 19.3% of their annual expenditures to transportation expenses and the poorest 20% of households spend over 40% (STPP, 2003a). However, this high resource allocation still does not buy equal auto ownership for all. Although transportation is now the second largest household expense for low and middle income Americans alike, the carless rate for non-Hispanic white households is 8%, compared to 24% for African Americans (US Census, 2000). People of color are more than twice as likely as white people to use non-auto travel methods (Bullard, Johnson, & Torres, 2000). In addition, a higher proportion of females of every race are without autos when

compared to males of the same race (Pisarski, 1999), and single parent families are the most likely to fall into the zero vehicle household category (Urban Transportation Center, 2002).

In the era of post-welfare reform, all women are expected to join the workforce, but it has proved to be a long and expensive ride to get there. Low-income women lacking transportation advantage, particularly African Americans, have restricted employment opportunities and greater vulnerability to racial discrimination, occupational sex typing, status segregation, pay inequity, and other factors that operate against women/mothers in the labor market (Cohen, 2000; Waldfogel, 1998).

Both the Charity Organization Societies (COS) and the Settlement House Movement reflect Social Work's professional commitment to advocacy for public policies to ameliorate hardships endured by working class women and their children (Stuart, 1999). Historically, many of these policies, for which social workers advocated, dealt with a variety of diverse issues that impacted upon female's labor and earnings. Settlement Houses often promoted unionization, while providing such work supports for poor immigrant mothers as day nurseries and English classes (Abramovitz, 1996). New York COS founder Josephine Shaw Lowell established the National Consumers' League to protect department store shop girls, and during the depression of 1893 she instituted work relief programs for the unemployed (Stuart, 1999). Settlement House worker Florence Kelly initiated the use of clothing labels to denote conscientiously produced goods, promoted state and federal protective labor legislation, and served in the Bureau of Statistics of Labor (Sklar & Tyler, 2002).

Contemporary Social Work continues this commitment to improving the lives of females and mothers who are among the working poor with both just labor policies in general and transportation equity in particular. The National Association of Social Worker's (NASW) most

recent collection of policy statements, *Social Work Speaks*, indicates the profession's commitment to transportation needs and/or job access in over three separate NASW's policy statements, including the statements on Economic Policy, Family Policy, and Welfare Reform Policy (NASW, 2000).

Therefore, the current study's central hypothesis was formulated within social work's unique tradition of a dualistic perspective which incorporates both the 'personal' and the 'political' (Lundy, 2004). While acknowledging a woman's 'personal' struggle in managing her roles as parent and laborer, the study examines the 'socially' constructed barriers to mobility and access that render her struggle untenable. This dissertation tests the hypothesis that even after controlling for education and work experience, there is an additional contribution of carlessness on employment outcomes, in terms of reduced earnings and hours worked, which is strongest among parenting females, particularly African Americans.

Michael Sherraden's "Theory of Welfare Based on Assets" (Sherraden, 1991; 2000) and John Kain's "Spatial Mismatch Theory" (Kain, 1968), as well as the literature on role conflict, have informed the current racial analysis of the relationship between mothers lack of auto ownership and their average annual earnings and hours worked.

1.2. History of US Mobility Barriers

1.2.1. Class and Mobility

Historically, personal travel in America has always been marked by class distinctions. In the 18th and early 19th centuries, poor European immigrants paid dearly for travel to the New World by signing contracts into indentured servitude in exchange for safe passage across the Atlantic Ocean. It has been estimated that one half to two-thirds of the white immigrants arrived

as indentured servants or “redemptioners,” with four to seven years of labor required to redeem the cost of their sea passage (Baxandall & Gordon, 1995; Glenn, 2002).

In early American eastern territories, both gentleman and farmers owned horses, but farm horses were dedicated to field labor rather than personal conveyance (Johnson, 1997). Hackneys, horse-drawn carriages for hire in the early 1800s, were the first mode of transportation for the public’s short trips in the city (Jackson, 1991). However, carriages were a luxury and a sharp divide existed between ‘carriage folks’ and others (Johnson, 1997).

Economic restraints on travel excluded the poor from pursuing many of the dreams hoped to be realized through the country’s western expansion. The legendary westward-bound frontier pioneers were in reality limited to those who could invest the time, and purchase the provisions for the demanding journey (Baxandall & Gordon, 1995).

Public transportation options began to steadily expand in most US cities throughout the 1800s but was still restricted to individuals with some level of wealth. The omnibus and the horsecar were the prominent walking alternatives in urban communities, prior to the advent of the electric streetcar in the last decade of the 19th century. The omnibus was a 12-passenger horse drawn coach with unpadded benches that traveled over bumpy cobblestone roads. City governments, often influenced by cronyism, typically granted exclusive operating contracts on designated streets to private entrepreneurs who were already in the livery or freight business. In exchange, the omnibus committed to the delivery of a specific quantity of services. (Jackson, 1991).

The horsecar was a horse drawn streetcar, or an omnibus pulled by a horse over smooth iron-rails rather than rough roads. It was faster and cheaper than the omnibus. The horsecar offered as many as 40 passengers each trip a more tranquil ride at eight miles per hour, which

was twice the speed of the traditional omnibus. This advantage decreased operating cost, resulting in a horsecar fare that was 5 cents below the 15 cents fare of the omnibus. Omnibuses were soon banished to the secondary routes as horsecars dominated the main thoroughfares in New York, Baltimore, Pittsburgh, Philadelphia, Boston and Chicago. At its peak in 1885 there were 415 street rail-way companies operating over six thousand miles of track and transporting 188 million passengers a year (Jackson, 1991). However, even these reduced fares were too high for most poorly paid workers in this era and overwhelming the working class poor traveled to their destination by walking until the electric streetcar and the widespread nickel fare gained popularity just prior to World War I (Dunn, 1981).

In the early years of the 20th century, planning for both transit and land use were often coordinated in a manner that powerfully influenced cities' development and entrepreneur's fortunes. Public transit was a profitable business that large traction companies, with the assistance of corrupt city officials, would eventually come to dominate. It was not the nickel fares, but the acquisition, development, and sales of real estate along the transit routes that inflated the fortunes of the traction magnates of this era (Dunn, 1981; Urban Transportation Center, 2003). Private industry developed and extended streetcar technology throughout the US from 1887 to 1903. This was accomplished in US cities faster than any other transportation technology in history, including the auto, which wouldn't become dominant until almost a half century after its invention in 1896 (Jackson, 1991).

In this era when private entrepreneurs were swiftly developing urban transit, US cities were rapidly expanding. From 1860 to 1900 the proportion of Americans living in cities increased from one-sixth to one-third and by 1920 it increased to one-half. New York City's population increased from 1.2 million to 4.8 million from 1860 to 1910. In this same period, both

Philadelphia and Boston tripled their populations and crowded living conditions were horrendous in the ghetto slums that spawned poverty, crime, and disease (Trattner, 1999).

This explosive expanse ushered in an era of weak city governments, and greedy city officials, who were more absorbed with “wheeling and dealing” to secure and procure favors, than good governance or sound transportation planning. Muckrakers and municipal reformers of this era condemned urban government as hopelessly corrupt, inefficient and boss ridden (Katz, 1996). Transportation development in particular was subject to affluent entrepreneur’s ruthless and unbridled financial speculation and manipulation, which was unregulated by government (Cheape, 1980; Dunn, 1981). New York provides two excellent illustrations of how local transportation policy, born in this political climate, was often designed to accomplish goals other than improved mobility. Transportation policy then as now, was just as likely to manipulate the poor to protect the interests of, or increase profits for those of wealth and power as to serve the mobility needs of the masses.

In the early 20th century, New York’s powerful native business leaders viewed quick and cheap transportation, for the dispersion of immigrants from the slums to regions outside the city, as the solution to improving urban conditions (Katz, W.B., 2001). They also intended to develop transportation in a manner that scattered the Irish constituents of the big city bosses to break their political power (Katz, W.B., 2001). Building a transportation system was a popular solution to slums was because zoning, slum clearance, and tenement-house reforms would not yet be included in the reformer’s agenda for another 20 years (Katz, M.B., 1996.) Indeed, even Lawrence Veiller, the most influential housing reformer in the Progressive Era, viewed dispersal of the tenants as the simplest and best solution to the slum problem because of his opposition to

government interventions in housing beyond restrictive legislation (Katz, M.B., 1996; Katz, W.B., 2001).

Therefore, in 1900 August Belmont's company, began construction of the Manhattan subway system, the Interborough Rapid Transit (IRT) (Katz, W.B., 2001). It would come to be the first fully integrated rapid transit system in the world. When IRT began operations in 1904 it had 28 stations along 9 miles of track. IRT was extended to the Bronx, Brooklyn, and Queens by 1915 (Katz, W.B., 2001). Incidentally, slum conditions were not resolved by the transit system and the political competition in the city remained robust.

Twenty years after this dispersal of poor immigrants by means of public transit, New York's power broker, Robert Moses, would use millions of dollars in public funds to intentionally design and construct parkways and bridges with clearances that prohibited busses (Caro, 1975). This transportation infrastructure greatly privileged private automobiles. The effort was primarily targeted at African Americans, but other poor laborers reliant upon buses were also restricted from travel into the New York city's critical employment and recreation centers for the next several decades (Caro, 1975).

Although transportation expansions often enriched private developers, and were specifically designed to enhance their wealth and further their political and financial interests, it is undeniable that many of the common working folk would also eventually reap substantial benefits. Particularly the during the golden age of the streetcar, just prior to World War I, when low fares and frequent services attracted riders from all social classes (Dunn, 1981). Notwithstanding transit's evolution toward servicing the masses, there were particular populations that were excluded from many or all benefits of the steadily progressing transportation advancements, particularly African Americans.

1.2.2. Race and Mobility

Prior to Rosa Parks, African American women had struggled for travel liberties for over a century. Harriet Tubman, among other ‘conductors’ on the Underground Railroad, guided thousands of freedom seekers along intricate trails and waterways away from the bondage of slavery, toward northern territories and liberty (Abramovitz, 1996; Boyd, 2000). At the height of its capacity from 1830 to the end of the Civil War, almost 2,000 slaves, often trailed by patrollers and bounty hunters, embarked each year upon this perilous journey to freedom because of restrictions in all other travel modes (Gensheimer & Gensheimer, 2003). As Pennsylvania led the nation in legislation to abolish slavery, Philadelphia, site of the first abolitionist society in the world (Green, 2000), experienced a 176% increase in its African American population between 1790 and 1800 (Newman, 2000) mostly due to its popularity as an Underground Railroad destination.

People of color were excluded from the earliest streetcars in Washington DC until Sojourner Truth brought a criminal assault action against the company that had forcibly removed her from a streetcar in 1865 (ABF, 1992). A prominent abolitionist, minister, and women’s rights activists, Sojourner Truth was nearly seventy-years old when she denounced the indignities of this transportation injustice in the nation’s capital.

Ida B. Wells was a twenty-year-old schoolteacher in 1884 when she brought her first suit, which was followed two years later by another against the Chesapeake Ohio & Southwestern Railroad Company. Ms. Wells was returning to her place of employment after visiting an aunt in Memphis, Tennessee. This young teacher, who would become a celebrated journalist and crusader against lynching, insisted that she would not pay the same fare as the white ladies and

accept inferior accommodations. Ms. Wells had held fast to her seat as the conductor and two male passengers battled to forcibly remove her from the ‘ladies car’ (ABF, 1992).

There were many differences in race and gender segregation and exclusion practices on common carriers in the earliest era of mass transportation. These practices varied over time, varied by region, and varied by carrier (ABF, 1992; Roback, 1986). However, prior to the end of slavery, most people of color were excluded from most common carriers. Slaves and servants were permitted to travel alongside their masters and mistresses, but in the pre-war South free blacks were banned from or segregated within steamboats, packets, railroads and streetcars (ABF, 1992; Green, 2000).

Similar practices existed in the North and West. Segregation patterns known as “Jim Crow” originated and were firmly entrenched in the North. Free people of color were alternately excluded from travel or assigned to segregated seating on railway cars, omnibuses, stagecoaches and steamboats. The segregated seats were inferior accommodations, which ranged from baggage cars to spaces in close proximity to livestock. Steamboats typically banned African Americans from cabin passage and relegated them to the deck throughout the voyage. Depending upon the carrier, the fare for these inferior accommodations was often equal to that paid by the more privileged passengers. (ABF, 1992)

Prior to the war exceptions to these discriminatory patterns could be noted, particularly if the African American passengers possessed both social standing and wealth. However, the color lines on common carriers became more inflexible once slavery was abolished. As a result, black women of wealth, formerly able to purchase access to ‘ladies cars’, were denied access to these reserved cars shortly after the beginning of the Reconstruction era. Therefore, regardless of their

education, manners and money, single women, mothers and wives who were not white were universally denied the respect and status of a 'lady' (Davidson & Sweeney, 2003).

Following the Civil War, the restraints, which most southern states placed upon the economic and physical freedom of those formerly enslaved, were laws known as Black Codes (Davis, 2003). One impact of these Black Codes was to separate the races in public transportation. For one brief decade, the federal government declared these discriminatory codes illegal during the transitional period of Congressional Reconstruction by enacting the Fourteenth and Fifteenth Amendments, as well as the Civil Rights Acts of 1866 and 1875. The latter stating: *"That all persons ... shall be entitled to full and equal enjoyment of the accommodations, advantages, facilities, and privileges of inns, public conveyances on land or water, theaters, and other places of public amusement."*

However, by 1883 the Supreme Court ruled this Civil Rights Act unconstitutional and in 1896 upheld the 'separate but equal' language in *Plessy v. Ferguson* (Green, 2000; Sanchez, Stolz, & Ma, 2003). Therefore, it was a transportation related policy that legitimated 'Jim Crow' on a national level and strengthened the legal provisions to subordinate African American's position in both transit and in society in general. This shameful period of U.S. history that began in the 1890s would endure until the 1960s (Davis, 2003; Green, 2000).

Initially, the automobile appeared to finally offer African Americans of means personal liberty in travel and the potential to escape Jim Crow. However, even after Henry Ford's innovation of assembly line auto production reduced the price of automobiles, the comparatively small number of African Americans able to afford cars faced significant obstacles to its usage. Everything from white owned insurance company's refusal to issue blacks policies, to service station's reluctance to sell blacks petroleum products, became potential difficulties for every

African American traveler. In response, Victor H. Green began publication of the Green Book in 1936. The Green Book was an important guide for African American motorists. It published information on specific business throughout the nation that provided travel and auto related services to people of all races (Davidson & Sweeney, 2003).

Even after World War II when both middle class whites and African Americans found auto ownership more attainable, discriminatory labor market practices, high unemployment and underemployment among African Americans would preclude many other African Americans from obtaining travel advantage. It was among these bus reliant African Americans that the struggle for freedom of mobility would continue on the common carriers. African Americans in Baton Rouge, Louisiana staged the first successful bus boycott in 1953, which cost the local bus company over \$1,600 a day before it conceded (Bullard & Johnson, 1997). About a year after the celebrated 1954 Brown V. Board of Education overturned the practice of “separate but equal,” Rosa Parks would spark the modern day Civil Rights movement by refusing to submit to local Jim Crow laws in Montgomery Alabama. In 1961 Greyhound busses were attacked and burned as John Lewis and the Freedom Riders exercised their right to interstate travel (Bullard & Johnson, 1997).

Collective and individual struggles for transportation equity continue to the current day. Organizations like Los Angeles’ Bus Riders Union battle for fair transit services and public transit investments that would cease directing the vast majority of resources to the transit needs of wealthy, mostly white suburbanites. In the past decade, the LA Bus Riders Union and their coalition have won almost a billion dollars in concessions related to fare reductions and reinstated transit services for low-income people and people of color residing in LA (Garcia, 2000). In addition, the Wiggins family of Buffalo New York recently won a landmark case

against transit racism. Pyramid Companies of Syracuse NY, owners of the Walden Galleria Mall, agreed to pay \$2 million in settlement of the transit racism civil charges related to the death of the 17 year-old, African American food court employee, Cynthia Wiggins. Wiggins was crushed by a dump truck while crossing a seven-lane highway because city busses were banned from stopping directly at the suburban mall (Bullard, Johnson & Torres, 2000). However, for each of these high profile victories there are tens of thousands of low-income people who remain dependent upon under funded, non-responsive, and inadequate public transportation networks.

1.3. Evolution and Impact of Federal Transportation related Policy

Typical of most public policy, federal transportation policies have been regulatory and legal responses to interest groups. Interest groups ranging from the auto industry and transit worker's labor unions to environmentalists and highway construction business have defined the "problem" to be addressed through transportation legislation as everything from national defense, air quality and traffic congestion, to driver safety, urban renewal and social equity. However, the current discussion will be limited to the evolution of transportation policy in terms of how federal bias in funding has compromised public transit systems and privileged the private automobile as a mode of travel.

Initially, the automobile was regarded as a pleasure vehicle for the wealthy. Road systems consisted of short segments built from the cities into the countryside (Weiner, 1999). Responsibility for the first road construction and maintenance projects belonged solely to the states. States began building roads for private autos with general revenue funds as early as the 1890s and began earmarking gas tax revenues in the 1920's (Dunn, 1981). Federal aid to road construction for automobiles was first introduced in the Federal Highway Act of 1921, although public transit would operate without federal dollars until the 1960s. This Act initiated a

continuous national system of two-lane, paved roads that connected large population centers. By the early 1930s this road system was in place. (Weiner, 1999)

In 1956, under the Interstate and Defense Highway Act (IDHA), the federal government subsidized the construction of highways with the largest public works program the nation had ever undertaken (Meyer & Gomez-Ibanez, 1981). IDHA provided funds for 41,000 miles of multi-lane, high-performance interstate highways. The Act's initial budget of \$27 billion was repeatedly revised upward until the final cost reached \$104 billion by 1977 (Meyer, et al, 1981). This was an infamous project that cut wide paths through low-income and black neighborhoods, which served to physically isolate residents from their institutions and business.

IDHA's unprecedented commitment of federal funds to advancing the use of private autos without simultaneous support of public transit would bring about the demise of urban public transit, as ridership on an outdated transit infrastructure waned after the war. The newly constructed freeways financed through IDHA facilitated residential patterns that assured auto dependence. Post-war prosperity and federal housing policies also encouraged the middle-class 'white flight' from the cities (Davidson & Sweeney, 2003). This movement of affluence out of the city was further hastened by the 1954 Supreme Court ruling prohibiting school segregation and Americans rapidly sought out single-family housing in racially homogeneous white suburbs (Davidson & Sweeney, 2003). On the other hand, deed restrictions, racial covenants, and redlining practices in this period, although ruled unconstitutional in 1948, still severely limited the residential options for African Americans (Katz, M.B., 1996).

To contend with dissatisfaction over failed federal urban renewal projects, the eruption of a series of urban riots and the expansion of the Civil Rights movement, the federal government postured a more 'balanced' transportation agenda. The Urban Mass Transit Act of 1964 was

supposed to portray a ‘balance’ in federal support between subsidies for public mass transit, which by this time was in poor repair, and highway construction for private vehicles. However, the \$150 million Congress appropriated in this historic, first time support for public transit was not very balanced compared to the billions that had been and continued to be spent on highways (Meyer & Gomez-Ibanez, 1981, Weiner, 1999). This Act was supported by conservatives partly because the new highways constructed under the Interstate and Defense Highway Act of 1956 had not resolved traffic congestion. There were expectations that improved public transit would curtail auto traffic and ease highway travels (Meyer et al, 1981).

As might have been expected with such paltry expenditures, the Urban Mass Transit Act (UMTA) failed to accomplish its goal. Cities that had not already done so purchased troubled private transit companies that were still in operation with UMTA funds, which were restricted to capital expenditures. The major immediate effect was a sharp rise in bus sales, from 2,200 in 1960 to 3,400 in 1970. Ironically, the primary beneficiaries of new high-performance mass transit facilities were a few high-income property owners and suburbanites whose residential subdivisions obtained faster commutes into the city, rather than the city residents themselves (Meyer & Gomez-Ibanez, 1981).

This Federal bias in transportation subsidies would continue throughout the century, becoming somewhat more severe during the 1980s in Reagan’s era of deregulation when there was a sharp change away from what little advances had been made in the promotion and coordination of different transportation modes (Vuchic, 1999). Unprecedented amounts of money were spent on road-building after the passage of the Surface Transportation Assistance Act of 1982, which increased federal gas taxes from 4 to 9 cents (Carver, 1984). Federal highway expenditures doubled between 1980 and 1995, but there was no increase in transit

expenditures. Therefore, after inflation adjustments, in real terms transit funds decreased (Vuchic, 1999).

The passage of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) heralded the dawn of a new era in transportation planning. ISTEA was the result of heavy lobbying efforts by environmental groups for greater local flexibility in the spending of federal highway dollars. ISTEA's emphasis on integrating land use and transportation planning was an important achievement for environmentalists in this era. Nevertheless, ISTEA's Title I authorization of \$63.9 billion in highway projects was seven times more than the \$9.2 billion authorized for non-highway projects (Yee, 2003). ISTEA is generally recognized as a watershed moment in transportation policy because it made the tentative first steps toward opening up transportation policy to local community dialog by mandating "broad public participation" throughout the planning process.

The 1998 Transportation Equity Act of the twenty-first century (TEA-21) continued the trends established in ISTEA and increased federal transportation funding 40% over the following six years. The \$217 billion in federal transportation dollars authorized through TEA-21 included \$172 billion guaranteed funds for highways and \$36 billion for transit. In addition, TEA-21 decreased by 54% the proportion of federal funds allocated to the construction of new highways (Yee, 2003).

TEA-21 was the first time in history that social provisions were included in a transportation policy. Influenced by the welfare reform legislation of this era, TEA-21 funds were earmarked to provide new transit options for central city job seekers to reach jobs in the suburbs (Blumenberg et al, 2003).

ISTEA and TEA-21 responsiveness to the realities of metropolitan travel have been the first step in a revolution in federal transportation policy in four major areas. First, these laws devolved greater responsibility for planning and implementation to the local Metropolitan Planning Organizations (MPOs), which are accountable for operating under the principles of effective citizen engagement. Second, reliable, and more important flexible, funding sources were guaranteed through federal gasoline tax revenues. Prior to ISTEA, highway program funds were not available to finance projects of another transportation mode, for instance transit. Third, system preservation is emphasized to encourage maintenance of, and reinvestment in, existing infrastructures as opposed to building new highways. Finally, new statutes require transportation planning to move beyond mobility concerns to address other social, economic and environmental outcomes related to transportation. For instance, compliance with national clean air quality standards and execution of the Job Access and Reverse Commute (JARC) program are both important components of transportation planning under this legislation. (Katz, Peuntes, & Bernstein, 2003)

The initial results from the implementation of these new transportation policies have been promising. Throughout the 1990s, federal appropriations for transit doubled from \$3 to \$6 billion. Spending on bike paths and pedestrian projects swelled from approximately \$7 million to over \$222 million. Light rail systems have been expanding throughout the nation, especially in the South and West. Consequently, growth in transit ridership has exceeded the growth in driving for five straight years, an unknown phenomenon since World War II (Katz, Peuntes, & Bernstein, 2003).

The major limitations of the new transportation policies generally center upon concerns related to power and money. State Departments of Transportation (DOTs) receive and manage

all the federal transportation money and most of the state matching funds. The governor and state DOTs have veto power over projects proposed by local MPOs. In essence, metro areas only control 10 cents of every dollar they generate despite the fact that these metropolitan local governments own and maintain the majority of the transportation infrastructure. Therefore, the first problem is that metropolitan transportation needs are subordinate to State interests (Katz, Peuntes, & Bernstein, 2003).

The second problem is the continued highway bias in transportation funding. In addition to the extreme disparity in federal dollar allocations between transit and highways, the federally mandated matching formulas encourage a similar disparity among state funding. The federal contribution to road projects is 80% compared to 60% for transit projects, and the Bush administration has recommended that the transit match be reduced to 50% in 2004. This funding inequity is exacerbated by the fact that 30 states prevent the use of their state gasoline tax revenue for purposes other than road construction (Katz, Peuntes, & Bernstein, 2003).

In conclusion, a century of transportation funding directed toward highways and restricted from public transit has resulted in transit systems that are inadequate to meet the needs of low-income single mothers in the post-welfare reform era. Transportation policy has a pivotal role in resolving the current dilemma, and, significantly, TEA-21 is scheduled for congressional reauthorization in 2005. However, the low level of investment in public transit through the years has resulted in a significant measure of transportation disadvantage for most individuals dependent upon its services.

2. THEORIES

The study's central hypothesis is that transportation disadvantage, defined as a lack of auto ownership, significantly diminishes the impact of human capital upon economic outcomes, in terms of decreased earnings and hours of employment. This impact is expected to be strongest among African Americans and parenting females, therefore particularly for African American mothers.

This hypothesis was informed by three theories. The two macro theories informing this study are Sherraden's theory of Welfare Based on Assets, which addresses the importance of auto ownership in leveraging maximum economic outcomes; and Kain's Spatial Mismatch Theory, which explains the impact of transportation disadvantage on wages for residentially segregated low-income residents, particularly African Americans. The Work-Family-Fit model is a micro perspective that further explains the unique conditions contributing to most low-income mothers' inability to overcome the impact of transportation disadvantage on their wages. In other words, the Work-Family-Fit model clarifies how the lack of an auto prohibits low-income mothers from optimum participation in the labor market.

2.1. Michael Sherraden's Theory of Welfare Based on Assets

Throughout much of the last century, means tested U.S. welfare policies, which prohibit asset accumulation, alleviated some of harshest circumstances for poor families. However, these programs failed to elevate families out of their poverty. A twenty-year review of US poverty levels from 1965 to 1985 revealed there had been no decline in pre-transfer poverty levels (Danziger & Plotnick, 1986). A subsequent study tracking individuals, ages 22 to 39 years old, from 1968 to 1991, discovered that more than 50% of those whose incomes placed them initially

in the bottom income quintile remained there twenty-three years later. This rate was 78% for single mothers receiving public assistance, and 72% for non-whites (Danziger & Gottschalk, 1998).

In the post welfare reform era, labor force participation was mandated for virtually every poor family. With few exceptions, former public assistance recipients have joined the swelling ranks of the working poor (Anderson, Halter, Julnes, & Schuldt, 2000; Lopest, 1999, 2002). There is a growing recognition that low wage jobs are similar to low level assistance programs, in that they maintain women's places in poverty.

While paltry income interventions, as a singular strategy for reducing poverty, were largely proven ineffective by the final decades of the 20th century, the role of assets began to gain attention (Sherraden, 2000; Shobe & Page-Adams, 2001). This was a natural outcome of an era in which the startling growth in income inequalities was actually being surpassed by inequalities in wealth (Hartman, 2001; Shapiro & Wolfe, 2001).

Asset accumulation has been promoted among the non-poor through a variety of institutionalized mechanisms. The preferential tax treatment of capital gains, which is the appreciated value of assets, is a prime example. Furthermore, throughout history the U.S. has sponsored many asset promoting programs ranging from the earliest Homestead Act that granted property to 19th century Americans, and the GI Bill for WWII veterans, to modern day IRAs, pensions, and tax deductions for interest on home loans (Shapiro, 2001; Shobe & Page-Adams, 2001).

Conversely, most means tested programs directed toward poor women have discouraged wealth and asset accumulation (Carney & Gale, 2001; Urban Institute, 2001). Welfare eligibility rules have required applicants to "spend down" assets before women were eligible to participate.

Historically, the value of a woman's vehicle disqualified her for public assistance (Urban Institute, 2001). It was not until after welfare reform that 22 states excluded the full value of one vehicle from TANF asset limits (Rowe, 1998) and several years later that food stamp eligibility standards were altered to permit auto ownership while retaining benefits (Cox & Utt, 2003).

Historically, acknowledging wealth, distinct from income, as critical to individual well being was common among many major social theorists (Giddens, 1971). Karl Marx and Max Weber both shared a premise that property ownership is the primary basis of class division in a competitive market. Marx's conflict theory viewed assets in the rather narrow terms of capital or ownership of the means of production (Feuer, 1959). Weber's view of assets was considerably broader, encompassing factors related to improved "life chances" such as a private education, and housing in an elite neighborhood, as well as income generating property. Weber recognized a social stratification with more dimensions than simply laborer and factory owner. In contemporary terms, Weber would have viewed the probability of attaining the 'good life' as very different for the unemployed urban poor; the middle class suburban professional; and the wealthy stock holder residing in an estate within a gated community. He would attribute these probability differences to their command of varying levels of resources and assets, as opposed to just their income differences (Giddens, 1971; Weber, 1968)

However, it was not until 1990, when Michael Sherraden began to formulate a contemporary "Theory of Welfare Based on Assets," that the more concrete theoretical underpinnings were available from which to begin understanding the intractability of poverty from an asset perspective (Sherraden, 1991). In Sherraden's conceptualization of poverty as asset and income related, he uses the analogy of ponds and springs, respectively. Steady powerful springs of income can sustain families and buildup household asset ponds. Robust asset

ponds filled from springs larger than a family's consumption needs can be invested into cultivating other assets and trigger healthy patterns of growth. When income streams are interrupted, these large asset ponds sustain family life. However, many income streams are smaller. Very small income springs often fail in dry weather and lack the opportunity to form asset ponds. The entire small spring is utilized to sustain life and this family is without an asset pond to assist through dry periods, much less for expansion purposes. Therefore, Sherraden concludes that assets and income are of equal importance to family well being (Sherraden, 1991).

Asset threshold is Sherraden's term to explain how a family must reach a certain level of asset accumulation to achieve a bundle of welfare effects. In his example, small savings slowly build, yielding little welfare, until reaching a *threshold*, or the amount required for the purchase of a pivotal asset. An asset such as a washing machine then yields significant welfare effects by saving time consuming and expensive trips to the laundry mat. A home in a nice neighborhood yields improved school systems, as well as an opportunity to replace rent payments with home equity creation. Assets have the potential to generate earnings and/or savings for their owners, and are often categorized as tangible (ie. property, savings accounts, durable goods) and intangible (ie. human capital, access to credit, social capital). Accumulation of both types of assets is critical to poor families' upward mobility (Sherraden, 1991).

Sherraden asserts that income only maintains consumption, but increases in assets, or attaining critical *asset thresholds*, permits people to view their world and how they interact with it in a different light. His theory sets forth a series of critical economic, as well as behavioral impacts of asset accumulation upon the poor. For the purpose of this discussion, the automobile

will be considered in terms of a pivotal *asset threshold* for low-income individuals, particularly females.

The focus of this study is the automobile, as a tangible asset and a critical *threshold* for parenting females. The role of the automobile in promoting access to improved employment opportunities and reducing mothers' costly time constraints in attending to domestic and wage earner responsibilities is explored in the following discussion.

Sherraden's theory posits the superiority of vehicle ownership over the current social service practice of issuing bus passes or purchasing bus "services" for low-income women. For the purpose of this study, the automobile attainment is considered in terms of a pivotal *asset threshold*. The automobile is viewed as a tangible asset and a critical *threshold* for low-income females, for achieving higher earnings and other assets. The study explores the role of the automobile in promoting access to improved employment opportunities (Kain's Spatial Mismatch Theory) and reducing women's costly time constraints in attending to domestic and wage earner responsibilities (Work-Family-Fit Model). In addition, the automobile is also considered in terms of its potential to actualize the benefits of other assets. Specifically, by controlling for education and work experience, the study examines the auto's capacity to maximize the impact of women's human capital in the labor market.

2.2. John Kain's Spatial Mismatch Theory

Thirty-five years ago, Harvard economist John Kain proposed that there was a "spatial mismatch" between affordable housing and available jobs (Kain, 1968). Central to the spatial mismatch theory is the observation that while economic expansion and job growth has been greatest in the suburbs, the largest concentrations of people, particularly African Americans, in poverty and in need of jobs are in central city areas (Kain, 1992; Holzer, 1991).

In support of this theory, auto ownership has been found to have a very large impact upon the employment prospects of the most segregated low-income workers, notably African Americans in metropolitan areas. Raphael and Stoll's study using the 1990 5% Public Use Micro Data Sample (PUMS) found that the largest impact between autos and employment occurred among workers spatially isolated from employment opportunities. They estimated that, if blacks enjoyed the same rate of car ownership as whites, it would eliminate as much as 45% of the black/white employment differential (Raphael & Stoll, 2000). Another study of employment and travel among white and black youth that used data from the National Longitudinal Survey of Youth Cohort, found positive effects of: 1) automobile ownership and 2) distance traveled during the job search and work commute, on wage outcomes (Holzer, Ihlanfeldt, & Sjoquist, 1994).

Spatial Mismatch Theory has become the chief framework for understanding the transportation needs of all low-income, central city residents, including welfare recipients. In fact, the US Congress cited the Spatial Mismatch theory as their justification for \$150 million in annual funding for the recent Job Access and Reverse Commute (JARC) program (Blumenberg & Waller, 2003).

Kain's theory posits that low-income, urban households, and racially segregated residences in a variety metropolitan settings are geographically isolated from job opportunities. Therefore, transportation is of paramount importance in accessing employment. Extending Kain's theory to the current hypothesis, we could expect that mothers, with very limited time resources, are even more seriously constrained to employment opportunities within short travel distances, as is suggested by the Work-Family-Fit Model. Consequently, as consistent with Kain's theory, mothers with lower transportation advantage are constrained to the less desirable, lower waged jobs.

2.3. Work-Family-Fit Model

Role theorists have developed a role strain literature that emphasizes role conflict from multiple and simultaneous demands, and role overload from an insufficient amount of time to meet all these demands (Coverman, 1989). The Work-Family-Fit theoretical model, which considers women's resources and obligations from both a family and workplace perspective, is another way of conceptualizing this role strain (Debord, Canu, & Kerpelman, 2000).

It is widely held that the current market economy generally cultivates a Work-Family-*Misfit*. Feminist economists have established that caregivers, particularly mothers, are called upon to heavily subsidize the market economy with their labor (Folbre, 2001; King, 2001). Although childless women's wages are 90% of men's, mothers earn only 75% of father's wages (Wessels, 2003). In addition, studies find that both men and women report that women perform significantly more of the household chores (Heymann, 2002) even when women's earnings exceed the earnings of their partner or spouse (Bittman, England, Folbre, Sayer, & Matheson, 2003). A scholar's recent review went so far as to colorfully describe the impact of these home and work place demands on women as "sucking them dry" (Folbre, 2001).

Work-Family-Fit studies of both low-income and non-poor families, and both married and single mothers have recognized the significance of transportation and time issues, among various other factors, as important contributors to levels of "fit" between all of a woman's roles (Brennan, Rosenzweig, Ogilvie & Ward, 1999; Debord, et al, 2000).

The term *trip-chaining* originated in the last decade to describe efforts to maximize time usage by combining family responsibilities, errands, and work travel. The 1995 Nationwide Personal Transportation Survey was one of the first projects to reveal trip chaining patterns and

the extent to which gender and parenting influence travel demands. Women are more likely than men to stop at multiple destinations on the way to or from work, as well as make more trips to and from work. Women with children, especially single mothers of small children, create complex *trip-chains* far more often than do men (McGuckin & Murakami, 1998). The necessity of adding non-work trips onto the work commute has been established as a vital pattern for employed mothers, and studies indicate that mothers who are university students are particularly dependent upon automobiles (Bianco & Lawson, 1998).

The Work-Family-Fit Model posits that women with care giving responsibilities, specifically working mothers, are particularly vulnerable to role overload and that most are unable to engage in longer commutes that will further increase their role strain. This implies that working mothers are more likely to be restrained by the lack of an auto and required to accept jobs within a shorter travel time, even if there are better jobs available by longer commutes. In addition, it implies that the more hours consumed by women's commutes may result in fewer hours available for paid labor.

2.4. Summary

In summary, Spatial Mismatch Theory and the Work-Family-Fit model provide the theoretical framework for the respective macro and micro influences of transportation disadvantage upon low-income mothers' wages. Sherraden's Theory of Welfare Based upon Assets provides the theoretical underpinnings for the study's strict definition of transportation advantage as auto-ownership, as well as the policy implications for this research.

This study seeks to extend the research on assets as poverty and income determinants with a focus on the private automobile. The limited work of previous empirical research linking assets to income dynamics have examined assets in aggregate or focused upon IDAs, with

minimal analytical attention to race and gender (Adams & Sherraden, 1997; Caputo, 2003; Shobe, 2001). This study will be a racial analysis on the impacts of autolessness, in the context of parenting. In addition, this study seeks to replicate and expand past transportation and employment outcome studies that utilized only regional data on welfare recipients, neglecting broader geographic and demographic analysis (Danziger, Corcoran, Danziger, Heflin, Kalil, Levine, Rosen, Seefeldt, Siefert, Tolman, 2000; Kalil, Schweingruber, & Seefeldt, 2001; Ong, 1996; 2002).

3. LITERATURE REVIEW ON TRANSPORTATION DISADVANTAGE

On the surface, it may appear that US citizens enjoy equal levels of transportation advantage. The dawn of the 21st century heralded the closing of the gender gap in drivers' licenses for the young and middle aged (Spain, 1996) and the rate of carless households in the U.S. declined from 21% in 1960 to approximately 8% throughout the late 1990s (Murakami & Young, 1997). Among every population segment, including the poor, minorities, and the elderly, the private car is by far dominate travel mode (Pucher & Renne, 2003). Although their vehicles may be older models and in poor repair, some studies indicate that even a slight majority of the welfare recipients now have vehicles (Kawabata, 2002).

However, in the last decade, the nation's total transportation expenditures have grown faster than inflation (Katz, Puentes & Bernstein, 2003), and now consume a disproportionate share poor families' household income (Bureau of Transportation Statistics(BTS), 2003; STPP, 2003a). As noted in the introduction, the average household allocates 19.3% of their annual expenditures to transportation expenses and the poorest 20% of households spend over 40%. This approximate annual average expense of \$7,633 is now the second largest budget item for most America's families, exceeded only by the costs of housing, and is more than three times the costs of health care (STPP, 2003a). In almost ten metropolitan areas, including Dallas, Pittsburgh and Atlanta, the proportion of the household budget directed toward transportation, actually exceeds that which is directed toward shelter (STPP, 2000). Nonetheless, the working poor, estimated at approximately 9 million workers by the US Census Bureau, spend less than half of what workers earning \$45,000 or more spend on their commute regardless if they own a vehicle or depend upon public transit (BTS, 2003).

3.1. Disparities in Owning and Operating Vehicles

In light of these spiraling costs, it is not surprising that a significant number of Americans remain without autos. This vehicle deprivation is experienced disproportionately by women, minorities and low-income families. For example, about 26% of low-income households do not have a car, which is six times the 4% rate for other households (Pisarski, 1999). The carless rate for non-Hispanic white households is 8%, compared to 24% for African-Americans, 17% for Hispanics and 13% for Asians (US Census, 2000).

These carless rates increase substantially in urban areas. For example, the carless rate of African-Americans is 49% in Pittsburgh PA and Newark NJ and approximately 45% in Philadelphia, PA and Baltimore MD (US Census Bureau, 2000). If this pattern could be attributed to the distinct advantages of public transportation in urban areas, white carless rates should correspond, which they do not. In addition, the gender gap in white carless rates is about 3 percentage points, compared to a 10% gap between minority females and males (Pisarski, 1999). Furthermore, low income households have a variety of transportation difficulties that extend beyond just vehicle ownership to vehicle condition and availability (Fletcher, Garasky, & Jensen, 2002)

Contributing to the racial and gender barriers in auto ownership are disparities in the purchase and operating costs of vehicles. Female and African American auto purchasers have been charged higher rates for auto loans and/or product purchases than have been charged to white male customers. These disparities have ranged from a mark up of 40% above that of white males for white females, to a markup of over 2 and 3 times the white male markup for black males and females, respectively (Ayres, 1991; Henriques, 2001). In addition, low-income consumers are subject to exploitation by what Karger (2003) describes as the fringe auto economy when a lack of adequate credit thrusts them into the predatory sub-economy. Cash-

strapped individuals forced into dealings with the independent used car dealers, auto auctions, sub-prime lenders and third chance financiers of the fringe auto economy because of their credit history, or lack of it, pay vastly inflated interest rates and auto purchase prices (Krager, 2003).

In addition, studies examining the implications of class and gender on car insurance premiums noted that the current system, which aligns premiums with the fixed costs of car ownership, serves to disproportionately charge low-income individuals who statistically drive fewer miles (Butler, 1996). The regressivity of the current auto insurance system was noted in Joint Economic Committee of the US Congress that presented data on the typical low-income household's auto insurance expenses over a two year period which exceed the value of their cars (Miller, 1998). Ong's most recent work estimated that lowering annual insurance premiums by \$100 could increase the odds of employment by 4% among welfare recipients, particularly those residing in "redlined" neighborhoods in which insurance is restricted by higher premiums (Ong, 2002). For years scholars have noted the injustice of high auto insurance premiums serving as a barrier to car ownership among the poor, while low-income drivers subsidize premiums for wealthier drivers (Butler, 1996). Indeed, these concerns echo the longstanding criticisms of insurance premiums of the past Nobel Prize winner, William Vickrey (Vickery, 1968).

Auto affordability aside, various other institutional mechanism often operate to threaten the transportation advantages gained by those minority and low-income individuals that have managed to access vehicles. After identifying women's difficulties in traveling to and from child care providers, work, and home as a major contributor to poor job retention, The University of Wisconsin conducted a study of the Wisconsin Department of Transportation driver's license records. This research concluded that 58% of the total driver's license suspensions were related to non-payment of fines and civil forfeitures, as opposed to traffic related violations, DWI or

drug convictions. Furthermore, these suspensions were disproportionately concentrated within central city Milwaukee's high poverty neighborhoods (Pawasarat & Stetzer, 1998).

The racial disparities in traffic stops are another impediment to African American's operation of a vehicle operation and their attainment of the highest levels of transportation advantage offered through autos. Racial profiling on our nations highways can subject minority drivers to grievous civil right violations and ultimately incarceration (Myers, 2002). Traffic studies on the New Jersey turnpike indicated that during a period when 13.5% of the vehicles were occupied by one or more African American, and 15% of the turnpike speeders were African American, Blacks were involved in 35% of the traffic stops (Lamberth, 1998).

The war on drugs has notoriously targeted racial and ethnic minorities, despite the fact that five times as many whites use drugs (Harris, 1999b). This has resulted in increased scrutiny from the highway patrols only for people of color. African Americans in Minnesota, the state with the highest racial disparities in incarcerations in the US, comprise 26% of the vehicle stops while constituting only 10% of the over 18 population, and even less of the driving population (Institute on Race & Poverty, 2001). The American Civil Liberties Union reported that at close of the last century blacks constituted 13% of the nation's drug users but 37% of those arrested on drug charges, and 55% of those convicted—not to mention 74% of the drug offenders sentenced to prison (Harris, 1999b). Indeed, such prominent African Americans as attorney Johnnie Cochran, Olympic athletes Al Joyner and Edwin Moses, entertainers Wesley Snipes and Will Smith, and social worker Karen Brank, have all been pulled over by law enforcement officers for what has been come to be know as “driving while black” (Harris, 1999a; 1999b).

Another disturbing transportation related racial disparity is that although African Americans and Hispanics travel less in motor vehicles than whites, their passenger vehicle

occupant death rates greatly exceed those of white travelers, even after controlling for social economic status (Braver, 2003). In light of the fact that traffic accidents are now the leading cause of death among all Americans aged 4 to 33, this is cause for concern (STPP, 2003b).

3.2. Consequences of Transportation Disadvantage

These statistics clearly indicate women, and low-income and minority families are likely to experience high levels of transportation disadvantage, and significant barriers in owning and operating vehicles. But what is the impact of transportation disadvantage? The benefits of owning a vehicle can be divided into the two general areas of access and time.

3.2.1. Employment Outcomes: Access to the Best Jobs

Transportation is consistently identified as a major barrier to low-income single mothers' employment (DeBord, Canu & Kerpelman, 2000; Brooks & Buckner, 1996). In a Georgia study of job seeking welfare recipients, those not yet employed were more than twice as likely to identify transportation barriers as the biggest obstacle (Brooks, Nackerud, & Risler, 2001). Recent studies from the University of Michigan's Poverty Research Training Center indicate that lack of car ownership was surpassed only by education and work experience in significance as a barrier to employment for welfare recipients (Danziger, et al, 2000).

A comparison of individuals by poverty status, public assistance status, and race concluded that the likelihood of employment varies greatly for all subgroups by auto access (O'Regan & Quigley, 1998). Examining the auto use patterns of public assistant recipients, both Ong (1996) and Cervero, et al (1999 unpublished) have found that welfare participants with access to cars have higher employment rates and earnings than do those who rely on other modes of transportation. In addition, it was recently found that among low-come single mothers in

Pittsburgh, the returns on a vehicle investment, in terms of wages, rivaled that of an investment in education (Lichtenwalter, 2004).

Lack of a driver's license and car had the strongest effect on current employment in a Michigan study of welfare recipients (Kalil, Schweingruber, & Seefeldt, 2001). In addition, in his most recent work, Ong's findings again note that automobiles facilitate employment among single women on TANF residing in automobile dominated metro areas (Ong, 2002). However, he also notes that these women face formidable obstacles to car ownership, such as higher car insurance premiums based upon their area of residence despite good driving records, and public assistance eligibility rules that prohibit vehicle ownership (Ong, 2002).

Most of these transportation and employment outcome studies were based upon welfare recipients. Traditionally welfare eligibility rules have required applicants to "spend down" assets before women were eligible to participate. In light of the literature reviewed, selling her auto could have dire consequences on women's earnings and employment.

In summary, the literature does indicate that auto ownership is likely to be correlated with employment and earnings. However, there is also another asset closely linked to poor mother's transportation—time. Placing time within Sherraden's framework, time is an asset critical to the stimulation of other assets, particularly to the pursuit of education and increased human capital that in turn increases earning capacity (Sherraden, 1991). Less time traveling also translates to more time available for waged labor.

3.2.2. Role Strain: Time and Efficiency

Role strain and role overload literature emphasizes role conflict from simultaneous demands and role overload from an insufficient amount of time to meet all demands (Coverman,

1989). Recent studies from Stockholm University in Sweden report negative impacts from women's increased role in the paid labor market while maintaining an uneven share of the unpaid domestic labor. Women experience twice as many stress related illness and musculoskeletal problems as men (Linden, 2000). This discrepancy was directly attributed to women's larger paid and unpaid workload. Tracking women's stress during off work hours, it was discovered that women's weekend and evening stress levels rise while men's decline. These findings duplicated a stress study conducted a decade earlier (Linden, 2000). Such role stress is intensified for women with fewer resources, and presumably for women in countries like the US, with less progressive social policies than Sweden.

The continued national trend toward community sprawl has had a tremendous impact upon American's and particularly American mothers' travel time and subsequent role strain. According to the Federal Highway Administration's Personal Transportation Survey (as cited in STPP, 2002) trips to work reflect only 16% of females' compared to 24% of males' total number of trips. Females with school-age children now make 20% more trips than the average for all women and 21% more than the average male. Chauffeuring, shopping and other errands account for over half women's travel, and in this era of sprawl the distances that Americans travel to go shopping have increased 88% since 1969, while the distance for family and personal errands increased 137% (STPP, 2002b).

Poor women and single mothers, especially of young children, are particularly vulnerable to role strain and challenges to their Work-Family-Fit (Mikolaj & Boggs, 1991; Voydanoff, 1993). Transportation patterns such as trip-chaining, which are critical to middle class mothers managing their roles as wage earners and parents, are even more so to low-income women lacking many of the resources available to others. Public transit precludes trip-chaining activity,

or greatly reduces its utility. Women without access to automobiles, especially when burdened packages and accompanied by young children, can find making non-work trips, as well as their daily work commute an insurmountable challenge (Bostock, 2001). Women without private vehicles often forgo important family errands (Bostock, 2001; Lupa, 1996) and women in need of substance abuse or mental health services for themselves or their children are often presented with still greater challenges because spatial access to services varies greatly (Allard, Rosen & Tolman, 2003).

These formidable domestic threats to women's attaining Work-Family-Fit provide only half the time travel, role strain, related factors. The journey-to-work trip is the other half of the challenge. Studies comparing travel time between residence-workplace pairs utilizing various commute modes within various cities find high time costs to public transit. Reliance on public transportation has been found to double the commute time for workers living and working in the central city, often more than an hour a day (O'Regan & Quigley, 1998). In Edin's Chicago and Charleston studies of low-income mothers in 1988 to 1992 (pre-welfare reform) commuting times for women without access to a vehicle ranged from one to two hours each way, totaling up to 4 hours per day (Edin & Lein, 1997).

Commute time studies indicate racial disparities in time consumed by the journey to work. African Americans have been found to spend more time traveling to work than whites, while covering less distance and with significantly higher time costs per mile (Holzer, et al, 1994). Even after controlling for education and a variety of others socioeconomic factors, throughout 10 metros in the US, African Americans had the shortest commute distances and longest commute time (Taylor & Ong, 1995). Similar racial findings were found among a sample of women of varying income levels in New York City (McLafferty & Preston, 1991).

These and similar studies continue to counter the myth that minorities' low incomes can be attributed to shorter time investments in their work commute (Johnston, 1998).

3.2.3. Summary

In summary, past transportation studies indicate that women, and low-income and minority families are likely to experience high levels of transportation disadvantage. It suggests that the cost of vehicle ownership and operation, and unjust regulatory statutes contribute to this transportation disadvantage. Past studies have also established associations between welfare recipients' access to a vehicle and their employment outcomes, and has provided evidence related to the near impossibility of women achieving a Work-Family-Fit without an auto, in light of the time restraints of parenting and work.

Therefore, this study's hypothesis was formulated in light of the multi-disciplinary research and literature from social work, urban planning, economics, transportation, women's studies, geography and other disciplines on the topic of transportation and women. The proposed study was designed to test the hypothesis that transportation disadvantage is associated with reduced earnings and hours worked, even after controlling for human capital, particularly for females, as compared to males; and African Americans as compared to Hispanics and whites. In addition, among females, parenting women's employment outcomes are expected to be reduced by autolessness more so than childless females or females with the fewest years parenting.

3.3. Addressing the Gaps in Research on Transportation Disadvantage

There are three major gaps in the current transportation and employment research that my dissertation intends to address. First, there have been conflicted findings related to the impact of auto ownership on employment measures for African Americans, with some studies finding significance positive impacts (Kawabata, 2002; Raphael & Stoll, 2000) and others finding no significant impact (Ong, 2002; Fletcher et al, 2002). This has led some scholars to conclude that spatial mismatch is no longer related to a racial divide, but is more indicative of a class divide (Fletcher, 2002). My current study seeks to contribute to this debate by testing the hypothesis that the negative impact of auto deprivation on earnings is stronger among African American women in comparison to non-Hispanic white women in a nationally representative sample of US residents. This is based upon my premise that lack of auto access leaves minorities more vulnerable to the negative impacts of spatial mismatch, as well as racial discrimination in the labor market (Cohen, 2000) and residential segregation (Darden & Kamel, 2000).

The second gap in the research is apparent in the lack of longitudinal analysis of both the dynamic changes in auto ownership, as well as the relationship between transportation and economic outcomes over time. Longitudinal studies of transportation and employment are virtually nonexistent. This study's racial and gender analyses seek to examine the duration of interruptions in auto ownership, and its impact on economic outcomes throughout the period from 1990 to 2002.

Another limitation in the current research is what O'Connor refers to as the 'welfare fixation' (O'Connor, 2000). Most of the recent transportation and employment research has been restricted to regional studies of welfare recipients (Fletcher et al, 2002; Kawabata, 2002; Ong, 2002) or studies of welfare recipients from a limited number of metro areas (Sanchez, Peng

& Shen, 2003). Those few national studies examining transportation and employment, which also included participants other than welfare recipients, utilized data from the early 1990's or before (Taylor & Ong, 1995; Raphael & Rice, 2002; Raphael & Stoll, 2000). My study intends to move beyond an exclusive focus on welfare recipients, and to extend the current transportation research with an examination of the prevalence and consequences of autolessness in a nationally representative sample of over 8,000 adults of all income levels.

4. CURRENT STUDY'S RESEARCH QUESTIONS & HYPOTHESES

4.1. Research Question

Therefore, this dissertation will contribute to filling in the gaps in the existing transportation research by addressing the following two critical questions.

1. What is the prevalence and persistence of auto deprivation in the US over the past decade, and how does this vary within racial and gender categories?
2. What is the relationship between long-term or chronic transportation disadvantage and employment outcomes; and how does this vary by race, gender and parenting status?

4.2. The Hypotheses

This dissertation will test the following hypothesis through a secondary data analysis. After controlling for education, work experience and a variety of other demographic variables, the number of years without auto ownership will be associated with reduced employment outcomes, defined as average annual earnings and average annual hours worked.

The moderating effect of gender, race, and parenting in this model will be tested. It is hypothesized that the negative relationship between the years without auto ownership and employment outcomes is stronger among females than males, and within the subgroup of females it is expected to be strongest among females with parenting responsibilities. Furthermore, this inverse relationship between autolessness and earnings is expected to be stronger among African Americans than whites or Hispanics, which would result in identifying

Black mothers as the population whose employment outcomes are most significantly reduced by autolessness.

In addition, in an attempt to illuminate issues of directionality, a supplemental analysis of participants with unsteady auto ownership will compare mean constant dollar earnings before and after participants achieved steady auto ownership. It is hypothesized that earnings will be significantly greater in the period after steady auto ownership.

5. METHODOLOGY

5.1. Secondary Data: National Longitudinal Survey of Youth '79

The Bureau of Labor Statistics (BLS), which is an agency of the U.S. Department of Labor, is the administrator of the National Longitudinal Survey of Youth (NLSY). The BLS contracts with the University of Chicago's National Opinion Research Center (NORC) and Ohio State University's Center for Human Resource Research (CHRR) to design and execute the NLSY surveys. The specific survey set relevant for this study is referred to as the NLSY'79, because it was initiated in 1979 and has followed a cohort of participants selected from that period up to the present day. These NLSY participants were selected through a multi-stage, stratified area probability sample of dwelling units and group quarters in the US. Therefore, the NLSY sample was taken from among the residents in a random sample of housing units in selected areas of the United States.

In addition to the primary probability sample, two additional sub-samples were subsequently drawn to obtain intentional overrepresentation from one civilian group and one military target group. Blacks, Hispanics, and economically disadvantaged non-black, non-Hispanics were the civilian target group, and individuals enlisted in the armed forces comprised the military target group. Therefore, the NLSY79 was initially comprised of three independent probability samples, which represented residents of the United States born between January 1, 1957 and December 31, 1964. However, various funding constraints resulted in a discontinuation of a portion of the two sub-samples. The military sample was discontinued in 1984, and following the 1990 interviews, the sample of 1,643 economically disadvantaged non-black, non-Hispanics were also dropped from the survey. The result of these discontinued samples will be addressed further in the following section on "Retention Rate".

NLSY participants were surveyed annually from 1979 through 1994, after which, interviews were conducted every other year. The switch to biennial occurred within the period of the current transportation study. Therefore, the current study includes data from surveys conducted the five consecutive years spanning from 1990 to 1994, and the three even years from 1996 to 2000. Throughout this eight-panel period the NLSY respondents were between the ages of 26 and 34 years (1990) and 37 to 45 years (2002).

Interviews are usually conducted in person, but through the years as participants have become dispersed to remote areas or expressed a preference for phone interviews, the telephone interviewing increased to 32.5% of the interviews by 2000. The average length of an interview was one hour, and respondents were paid \$10 from 1979 to 1994; and \$20 from 1996 forward.

5.1.1. Retention Rate

Originally, the combined NLSY probability samples consisted of 14,574 individuals between the ages of 14 and 22 in 1979. Approximately 87%, or 12,686 individuals, agreed to participate in the study and responded to the 1979 survey. However, as noted earlier, due to funding cutbacks in 1984 and 1990, two sub-samples originally designed to obtain over representation from members of the military and non-black/non-Hispanic economically disadvantaged persons, were dropped from the original 12,686 NLSY sample. These reductions resulted in eliminating the supplemental samples of 1,079 military members and 1,643 non-black/non-Hispanics from all future NLSY interviews (CHRR, 2001). An additional 313 NLSY original participants were precluded from future surveys by 2000 due to their untimely death. Therefore, the adjusted NLSY sample size available for the current study was 9,651 participants, with a racial distribution of 50.2% white, 30.1% black and 19.7% Hispanic (CHRR, 2004).

The NLSY retention rate, or the number of respondents interviewed divided by the number of respondents remaining eligible for interview, ranged between 89.9% and 80.6% throughout 1990 to 2000 (CHRR,2001).

5.1.2. The Current Study's Sample and NLSY Missing Data

The current study's analyses utilize a sample limited to NLSY participants with complete data available for every study variable each year from 1990 to 2000. The current study's first set of analyses, which are simple descriptive analyses of the prevalence and persistence of autolessness, relies on sample of participants with complete auto ownership data. The study's subsequent analyses, on the relationship of autolessness on employment outcomes among those in the workforce, utilize a sample consisting of all participants with complete auto ownership data and labor history data; consequently it is a somewhat smaller sample.

5.1.2.1. Sample utilized in the Analysis of the Prevalence of Autolessness

Although 9,651 participants remained eligible for interviews throughout 1990 to 2000, only 7,079 (73.3%) completed a response to the auto ownership survey item in every one of the surveys throughout the decade of this study. Nonetheless, the gender and racial distribution of this sample of 7,079 with complete auto ownership data was 51.8% white, 29.8% black and 81.4% Hispanic, which is comparable to the original sample. (Table 1) Therefore, the sample (n=7,079) utilized in the first set of analyses provides a good general description of prevalence and persistence of national autolessness.

5.1.2.2. Sample utilized in the Analysis of the Relationship between Autolessness and Employment Outcomes

For the study's second set of analyses, the number of participants with complete labor history data throughout the decade, including complete and valid responses on the dependent variables, the earnings and hours employed variables, was less than 5,700. This resulted in a response rate of approximately 60% (5,700/9,651). In addition, complete work histories from 1979 to 2000, which was needed to calculate the participants' control variable related to accumulated work experience, was available for only 4,627 participants or 48% (4,627/9,651) of the sample (CHRR, 2004). In as much as complete data is missing for more than a half of the nationally representative sample, the result of the ANOVA can not be considered applicable to the nation as a whole, but only to the participants in this study.

The complex configuration of missing data in both the work history, and employment outcome variables, varied each year throughout the decade. Therefore, it was not possible to distinguish between individual participants in the workforce with missing earnings data and work history data, and individual participants not in the workforce with missing earnings data and work history data. Consequently, it was not possible to estimate the true extent of missing data in the multiple regression equations on employment outcomes for those in the workforce, and report the corresponding demographics. Nonetheless, it is important to note that the racial distribution of the original NLSY sample, and two samples utilized in this current research are not dissimilar. (Table 1)

Table 1. Comparability of NLSY '79 to Current Study Sample

	NLSY 1979 Nationally Representative Sample	Current Study Sample (Auto Ownership Data Complete)	Current Study Sample (Work History Data Complete)
RACE			
Non-Black Non-Hispanic (White)	50.2%	51.8%	57.6%
Black	30.1%	29.8%	25.2%
Hispanic	19.7%	18.4%	17.3%
Total	100%	100%	100%
GENDER			
Female	51%	52%	44%
Male	49%	48%	56%
Total	100%	100%	100%
TOTAL SAMPLE SIZE	N= 9,651	N= 7,079	N=3,614

In conclusion, the 3,614 NLSY participants in the laborforce from 1990 to 2000 with complete data on the study's central variables, constituted the sample for the analysis of the relationship between years *Auto Ownership* and average annual *Earnings*. Moreover, 3,387 NLSY participants in the laborforce from 1990 to 2000 with complete data on the study's central variables, constituted the sample for the analysis of the relationship between years of *Auto Ownership* and average annual *Hours Employed*. Essentially, these two analyses of employment outcomes are conducted on the same sample of participants, except for the 227 individuals in the workforce with complete earnings data but incomplete hours employed data.

For the purposes of the current study, participants were defined as in the workforce, if they reported being out of the laborforce less than 12 weeks each year from 1990 to 2000.

5.2. Measurement of Variables

The formulation of the study's central variables was greatly influenced by the recent work of Richard Caputo, which regards poverty and economic wellbeing in terms of an ongoing summative process, rather than a discrete event (Caputo, 2003a). Caputo is unique in his extensive utilization of cumulative measures in an examination of assets and economic mobility (Caputo, 2003a) and to a lesser extent in his study of the long-term impact of Head Start on a variety of economic success measures (Caputo, 2003b).

Therefore, this study employs cumulative measures, as opposed to measuring the relationships between the variables at one discrete point in time. In expanding the notion of poverty as a fixed status, this study views poverty as a continual threat to many already disadvantaged individuals attempting to sustain themselves and their families in a precarious economy. In addition, the cumulative measures reflecting eight years of data between 1990 and 2000 offer much more stability than a single survey year.

5.2.1. Operationalization of Dependent Variables

The study examined the long-term association between autolessness and two different dependent variables, *Average Annual Earnings* and *Average Annual Hours Employed* defined as follows.

Average Annual Earnings (Earnings). This variable effectively limited the analysis to individuals interviewed in 2000, who reported positive earnings in each of the eight survey years from 1990 to 2000 (Howell & Bronson, 1996; Zandvakili, 2002). The following three NLSY variables were summed to construct the *Average Annual Earnings*:

1. Total income from military service in the past calendar year

2. Total income from wages and salary in the past calendar year
3. Total income from farm or business in the past calendar year

Each year's nominal annual earnings was adjusted to real earnings, to reflect the changes in price levels over time, using the 2002 consumer price index (Zandvakili, 2002; 2000). The method selected to aggregate earnings over the 12 years of this study is a simple summing of the total annual earnings for each respondent, followed by dividing these earnings by 8.

Income averaging serves to smooth out financial peaks and valleys through time, and historically has been a fairly common method of accounting for income for a variety of purposes. In 1964, Congress adopted income-averaging taxation provisions applicable to income from most sources, which permitted lower marginal tax rates for a portion of a current years income in excess of prior years' income (Steuerle, McHugh & Sunley, 1977). Prior to 1964 income averaging was still permissible, but limited to income from inventions or artistic work that could be spread back to the specific period over which the work was performed (Steuerle et al, 1977). It was not until the Tax Reform Act of 1986 that income averaging was restricted, and in more recent years was limited to agricultural business and lump sum distributions of qualified retirement plans (Bennett, 2003; IRS, 2000).

Nonetheless, most wage equity studies rely on a static framework by comparing earnings in only one discrete period of time, typically over a single year. However, five and four year income averaging has been utilized in father-son comparative income studies (Solon, 1992; Zimmerman, 1992). In addition, multi-year aggregate earnings calculations have also been applied in wage equity studies of immigrants (Livingston & Kahn, 2002) and high-school dropouts (Tyler, 2004). Zandvakili (2000) examined gender earnings inequality over nine years to find a definite smoothing of transitory components that contributed to the overall findings.

Therefore, there is an established precedent for the dependent variable in the current comparative earnings analysis between those with and without auto access.

Average Annual Hours Employed (Hours). The NLSY variables on respondents in the labor force include a value on the number of hours the participant worked in the past year. This variable was summed throughout the 8 years under study, and subsequently divided by eight to obtain an average annual number of hours employed. Utilizing this variable will permit the identification of full-year, full-time workers with an approximate average of 1,750 annual hours worked, or the equivalent of 35 hours per week, for 50 weeks (US Census, 2003).

Although hours worked is often treated as an independent or control variable in regression equations on earnings, there is precedence for treating hours worked as a separate dependent variable in this current study. The Institute of Women's Policy Research, feminist economists, sociologists and others, regularly challenge the calculations of the male and female wage gaps that restrict the comparison to full-time, full-year workers (Crittenden, 2001; Folbre, 2001; Werschkul, 2004; King, 2001). IWPR charges that these calculations are misleading because they ignore the labor market experience of over half the working women who reduce paid hours in the workforce due to care-giving responsibilities for children & elderly family members, as well as other domestic responsibilities (Werschkul, 2004). Therefore, in an effort to capture the full impact of autolessness on parenting females' employment outcomes, earnings and hours will be handled in separate ANOVA analyses. To some extent, this separating out of hours employed will avoid understating the difference in earnings that is a result of autoless mothers' increased time-restraints from her travel demands.

5.2.2. Operationalization of Independent Variables

Years Parenting (Parenting). The Work-Family-Fit model suggests the impact of autolessness will be harsher for parents. NLSY questions administered every survey year that ask the number of biological, step and adopted children in the household will determine which respondents are actively involved in parenting. This NLSY variable was first transformed into a dichotomous variable whereby, 1= At least one child in the household, and 0=No child in the household and then subsequently summed to obtain the final *Years Parenting* variable.

For use as a moderator variable in the ANOVA, this variable was then transformed into a dichotomous variable to distinguish between participants with parenting responsibilities for more than half of the years studied and those parenting less than half of the years studied. Therefore, *Years Parenting* was coded 1= 0 to 4 years parenting; and 2 = 5 to 8 years parenting.

Years Married (Married). The NLSY has several variables with information on participant's spouses and partners. For the purpose of this study the collapsed variable which designates respondents as either 'married spouse present', 'never married' or 'other' was used to create a dichotomous variable whereby: 1= 'married spouse present' and 0=other. Summing this variable created the final *Years Married* variable.

Education Attainment (Education). A weighted average of the NLSY respondent's highest level of education attained throughout the eight years studied was created to obtain a differential between individuals earning college degrees prior to 1990 and those recently awarded college degrees. For example, an individual with a college degree in 1990 and with no additional education throughout the study period was assigned a 16, representing (16 yrs education x 8 years of study) / 8 years of study. Whereas an individual awarded a college degrees the last year

of period under study was assigned a 12.4, representing (16 years education x 1 year of study) + (12 years education x 7 years of study)/ 8 years of study.

Years Without Auto. For the purpose of this study, auto ownership is measured through one NLSY question. “Do you or your spouse own any motor vehicles that are primarily for personal use?” It is coded as 1= ‘yes’ and 0= ‘no’. The no responses were summed to obtain a score of the number of years without an auto, which ranged from 0 to 7 years. It is important to note that the auto ownership question was omitted from the 1991 NLSY survey, which means that respondents reported their auto ownership for only seven years from 1990 to 2000.

As noted in Table 2, the vehicle ownership rates among NLSY participants are substantially lower than the US national average in 2000, when autolessness was approximately 10% (US Census, 2000). This suggests a rich source of data from which to examine characteristics of auto-less households. The chart below represents overall carlessness rates of respondents for each NLSY survey year, and unlike the current study’s sample, it includes participants that did not provide auto ownership data every survey from 1990-2000.

Table 2. Vehicle Ownership Status of NLSY Participants

NLSY Survey Year	Vehicle Ownership		Total Respondents
	YES	NO	
1990	81%	19%	10,427
1992	80.5%	19.5%	9,005
1993	81.3%	18.7%	9,004
1994	83.1%	16.9%	8,884
1996	82.8%	17.2%	8,623
1998	83.1%	16.9%	8,379
2000	83.7%	16.3%	8,011

Because of the large skew toward continuous auto ownership, the number of *Years Without Auto* variable was coded into the following four level categorical variable for use in the ANOVA analysis.

Years without Auto from 1990-2000

<i>No Auto Disadvantage</i>	(0 years without an auto)
<i>Low Auto Disadvantage</i>	(1 year without an auto)
<i>High Auto Disadvantage</i>	(2-3 years without an auto)
<i>Very High Auto Disadvantage</i>	(4-7 years without an auto)

The *Gender* and *Race* variables were extracted from the 2000 survey, the terminal point in this longitudinal analysis.

Gender. The dichotomous variable was coded as 1= Male; 2=Female.

Race. In 2000, the NLSY obtained racial and ethnic variables through participant self-identification for the first time since 1979. The current study will limit race and ethnic categories to 1=African American (Black); 2=Hispanic; and 3=Non-Black, Non-Hispanic (White).

Urban Residence. The harshest impacts of transportation disadvantage will likely be experienced by urban minorities in regions subject to spatial mismatch and social isolation (Kain, 1968). The Lewis Mumford Center at the University of Albany has indicated improvements in urban residential segregation, but the US remains a nation of racially divided metropolitan areas (Logan, 2001). However, recent research of non-urban areas has found there to be higher levels of racial segregation outside the cities, even among individuals of higher socioeconomic levels (Darden & Kamel, 2000).

Controlling for all other variables, higher general earnings are anticipated among respondents residing in urban areas. Residents of rural areas without autos may also experience poorer employment outcomes, due to reduced public transit options.

NLSY respondents report their state, county, and metropolitan statistical area of residence at the time of each interview. CHRR merges this information with the Census 'City Reference File' and 'County & City Data Book' and categorizes the data based upon the locations percent of urban population. The NLSY data codes residence as either rural or urban.

Therefore, for each NLSY participant, a variable was created that reflected the number of years of residence in an urban area throughout the period from 1990 to 2000. Because this variable was highly skewed toward higher years in an urban area a dichotomous variable was created. The variable was transformed into a dichotomous variable to distinguish between participants residing in urban areas for more than half of the years studied and those residing in urban areas for less than half of the years studied. Therefore, *Urban Residence* was coded 1= 0 to 4 years in urban residence; and 2 = 5 to 8 years in urban residence.

5.3. Procedures for Data Analysis

Initially, descriptive statistics will be reported for the NLSY sample with complete auto ownership variables to illuminate the prevalence and persistence of autolessness throughout the decade from 1990 to 2000. Thereafter, the descriptive statistics will be reported for the sample of NLSY participants in the workforce, which is the sample to be used with the ANOVA.

Subsequent to the presentation of the descriptive statistics, will be the results of the bivariate analyses. The initial test for association between each of the independent and dependent variables will be conducted using the appropriate inferential statistic. The Pearson product moment is the parametric statistic that will be utilized once the scale variables have been reviewed for approximately normal distribution. The Pearson correlation coefficients (r) and the significant levels (p) will be reported. The nonparametric ordinal statistic, Spearman's rho, will

be reported in the bivariate analysis of variables not normally distributed and categorical data. These bivariate statistics will include the results of a simple cross-tab to indicate the likelihood that higher years of autolessness are associated with African Americans or females.

Finally, two separate ANOVAs will be conducted on the two different employment outcome dependent variables, earnings and hours employed. Ordinary least squares has unquestionably become the most predominate method for wage-equity studies (Loeb, 2003). However, since the central independent variable auto ownership was not normally distributed, and repeated transformation attempts failed to reduce the skew to an acceptable level, an ANOVA will be conducted rather than a multiple regression. The fact that the current study utilizes a complex set of categorical moderator variables renders an ANOVA as the most appropriate analysis.

Prior to conducting the two separate employment outcome ANOVAs, the data was screened to ensure fulfillment of test assumptions---independence of observations, normal distributions of subgroups, and equal variances among subgroups. Although, the Levene's test for equal variance indicated a significant violation of homogeneity among groups, an examination of the standard deviations of the boxplots for each cell was conducted to assure the problem did not compromise the ANOVA interpretations. Whereas there was a technical violation of the assumption, given the pattern of the cases with high standard deviations, the significant interactions interpreted and reported were not vulnerable to the threat of a Type I error.

In the two separate ANOVAs, the *F* ratio is a measure of the statistical significance of differences between group means and the differences between the combinations of levels of the independent variables (Mertler & Vannatta, 2001). In addition, the eta squared (η squared) will

provide the proportion of variance in employment outcomes that can be explained by auto ownership, and the interaction of auto ownership with race, gender & parenting.

After controlling for the human capital and demographic variables comprising the independent variables, it is expected that the employment outcomes will be significantly diminished among respondents with the fewest years of vehicle ownership. Furthermore, testing for the moderating effect of gender, race and parenting is expected to confirm that among respondents with high autolessness, African American females with the highest years parenting experience significantly lower scores on both of the employment outcomes.

In addition, there will be an attempt to illuminate issues of directionality with a final supplemental analysis of participants with intermittent auto ownership, who then achieved auto ownership stability within the decade. In this analysis there will be a comparison of mean constant dollar earnings before and after participants achieved steady auto ownership, utilizing a basic t test. It is hypothesized that earnings will be significantly greater in the period of steady auto ownership.

6. FINDINGS

6.1. Description Analysis

6.1.1. Description Analysis: NLSY Prevalence and Persistence of Autolessness

Of the 7,079 NLSY participants with complete data on the vehicle ownership variable from 1990 to 2000, almost 65% (n= 4,595) reported *No Auto Disadvantage*, or continuous auto ownership throughout the decade. An additional 11.5% (n= 815) reported *Low Auto Disadvantage*, or being without a vehicle for only a single survey year. For this sample, the mean number of years that respondents reported being without an auto was only 1.2 years. On the other hand, nearly 15% (n= 1,033) of the participants reported *Very High Auto Disadvantage*, or being without a vehicle for half or more of the years studied. (Table 3)

Table 3. Auto Ownership from 1990-2000

(N=7,079)

Auto Ownership from 1990-2000		
No Auto Disadvantage (0 yrs w/o auto)	4,594	64.9%
Low Auto Disadvantage (1 yrs w/o auto)	815	11.5%
High Auto Disadvantage (2-3 yrs w/o auto)	637	9.0%
Very High Auto Disadv. (4-7 yrs w/o auto)	1,033	14.6%
Total	7,079	100.0%

Table 4 provides details on the racial and gender composition of the sample's auto ownership from 1990 to 2000. Non-black, non-Hispanic females were by far the most transportation advantaged participants with 81% (n= 1,548) reporting *No Auto Disadvantage*, followed by non-black, non-Hispanic males, of whom 77% (n= 1,360) reported *No Auto Disadvantage* or uninterrupted vehicle ownership. Conversely, black males reported the highest levels of transportation disadvantage with the lowest rates of *No Auto Disadvantage* (41%), and highest levels of autolessness. Nearly 35% (n= 343) of black males reported *Very High Auto*

Disadvantage, or lack of private transportation for four or more survey years, compared with 4% (n= 70) and 5% (n= 95) of similarly situated white females and males respectively.

Table 4. Auto Ownership from 1990-2000 (By Race & Gender)

(N=7,079)

	Non-Black/ Non-Hispanic		African American Black	
	FEMALE	MALE	FEMALE	MALE
Auto Ownership				
No Auto Disadvantage	1,548 (81.0%)	1,360 (77.3%)	462 (41.3%)	402 (40.6%)
Low Auto Disadvantage	196 (10.3%)	191 (10.9%)	152 (13.6%)	126 (12.7%)
High Auto Disadvantage	96 (5.0%)	114 (6.5%)	162 (14.5%)	120 (12.1%)
Very High Auto Disadv.	70 (3.7%)	95 (5.4%)	343 (30.7%)	343 (34.6%)
TOTAL	1,910 (100%)	1,760 (100%)	1,119 (100%)	991 (100%)

	Hispanic		All Races	
	FEMALE	MALE	FEMALE	MALE
Auto Ownership				
No Auto Disadvantage	417 (61.2%)	405 (65.5%)	2,427 (65.4%)	2,167 (64.3%)
Low Auto Disadvantage	85 (12.5%)	65 (10.5%)	433 (11.7%)	382 (11.3%)
High Auto Disadvantage	82 (12.0%)	63 (10.2%)	340 (9.2%)	297 (8.8%)
Very High Auto Disadv.	97 (14.2%)	85 (13.8%)	510 (13.7%)	523 (15.5%)
TOTAL (N=7,079)	681 (100%)	618 (100%)	3,710 (100%)	3,369 (100%)

6.1.2. Description Analysis: NLSY Participants in the Labor Force

Over 3,000 NLSY participants, with complete and valid data on the central variables of this study, reported being in the labor force at least 9 months each year from 1990 to 2000. As noted earlier, for inclusion in this sample participants also had to report earnings (n=3,614) and hours employed (n=3,387) every survey year. Consistent with statistics from the US Department of Labor, which reports white males in this age cohort with the highest levels of labor force attachment at over 92% (Chao & Utgoff, 2004), the demographic composition of this sub-group shifts to a higher proportion of males and whites as noted back on Table 1.

For this NLSY sample limited to participants in the labor force, Table 5 presents the basic descriptive statistic on the central variables which are categorical, while Table 6 presents the continuous variables.

Table 5. NLSY participants in the Labor Force 1990-2000

CATEGORICAL VARIABLES		
Gender		
Female	1,584	44%
Male	2,030	56%
<i>Total</i>	<i>3,614</i>	<i>100%</i>
Race		
Hispanic	624	17%
African American	909	25%
Non-Hispanic/Non-African American	2,081	58%
<i>Total</i>	<i>3,614</i>	<i>100%</i>
Auto Ownership		
No Auto Disadvantage (0 yrs w/o auto)	2,742	76%
Low Auto Disadvantage (1 yrs w/o auto)	411	11%
High Auto Disadvantage (2-3 yrs w/o auto)	240	7%
Very High Auto Disadv. (4-7 yrs w/o auto)	221	6%
<i>Total</i>	<i>3,614</i>	<i>100%</i>
Parenting		
Low (0 to 4 years)	1,475	41%
High (5 to 8 years)	2,139	59%
<i>Total</i>	<i>3,614</i>	<i>100%</i>
Urban Residence (vs Rural)		
Low (0 to 4 years)	740	21%
High (5 to 8 years)	2,874	79%
<i>Total</i>	<i>3,614</i>	<i>100%</i>

Table 6. Initial and Transformed Distribution Statistics for Continuous Variables**NLSY participants in the Labor Force 1990-2000**

(N=3,614)

CONTINUOUS VARIABLES					
	Mean	Standard Deviation	Original Skew	Transform Skew	Procedure
Mean Annual Earnings in Constant Dollars (1990-2000)	32,662	18,698	1.54	.52	Square Rt.
Mean Annual Hours Employed (1990-2000)	2,166	474	.53		Unnecessary
Weeks Work Experience Since age 21	899	144	-.24		Unnecessary
Education	13.5	2.3	.48		Unnecessary
Years Married (1990-2000)	4.8	3.3	-.39		Unnecessary

Year Without Auto. Of the 3,614 NLSY participants in the workforce with complete data from 1990 to 2000, almost 76% (n= 2,742) reported *No Auto Disadvantage*, or continuous auto ownership throughout the decade. An additional 11% (n= 411) reported *Low Auto Disadvantage*, or being without a vehicle for only a single survey year. Conversely, only 6% (n= 221) of the participants reported *Very High Auto Disadvantage*, or being without a vehicle for half or more of the years studied.

As would be expected, Table 7 demonstrates that the rates of auto ownership are higher among this sample of participants in the workforce. There is more than a 10% increase in the proportion of the workforce sample reporting *No Auto Disadvantage*, as well as a 20% decrease in the proportion of the sample reporting *Very High Auto Disadvantage*.

Table 7. Auto Ownership for Participants in the Workforce 1990-2000

Auto Ownership from 1990-2000	Respondents with complete Auto Data (n=7,079)	Respondents with complete Auto Data in Workforce (n=3,614)
No Auto Disadvantage (0 yrs w/o auto)	64.9%	75.9%
Low Auto Disadvantage (1 yrs w/o auto)	11.5%	11.4%
High Auto Disadvantage (2-3 yrs w/o auto)	9.0%	6.6%
Very High Auto Disadv. (4-7 yrs w/o auto)	14.6%	6.1%
Total	100.0%	100.0%

White females in the workforce retain their position as the group with the highest levels of transportation advantage with 86% (n= 757) reporting *No Auto Disadvantage*, or uninterrupted auto ownership throughout the study, followed by 82% (n= 986) for white males. The level of auto ownership increases for every racial and gender group among this sub-sample in the labor force, compared to the overall NLSY sample, and blacks reported the greatest improvements,

with a nearly 20% increase in participants reporting *No Auto Disadvantage*. However, still only 58% (n= 258) black females and 57% (n= 266) black males in the labor force from 1990 to 2000 reported continuous auto ownership. (Table 8)

Table 8. Auto Ownership for Participants in the Workforce 1990-2000 by Race & Gender

(N=3,614)

	Non-Black/ Non-Hispanic		African American Black	
	FEMALE	MALE	FEMALE	MALE
Auto Ownership				
No Auto Disadvantage	757 (86%)	986 (82%)	258 (58%)	266 (57%)
Low Auto Disadvantage	80 (9%)	117 (10%)	74 (17%)	65 (14%)
High Auto Disadvantage	28 (3%)	58 (5%)	63 (14%)	52 (11%)
Very High Auto Disadv.	17 (2%)	38 (3%)	48 (11%)	83 (18%)
	882 (100%)	1,199 (100%)	443 (100%)	466 (100%)

	Hispanic		All Races	
	FEMALE	MALE	FEMALE	MALE
Auto Ownership				
No Auto Disadvantage	195 (75%)	280 (77%)	1,210 (76%)	1,532 (75%)
Low Auto Disadvantage	35 (14%)	40 (11%)	189 (12%)	222 (11%)
High Auto Disadvantage	14 (5%)	25 (7%)	105 (7%)	135 (7%)
Very High Auto Disadv.	15 (6%)	20 (5%)	80 (5%)	141 (7%)
	259 (100%)	365 (100%)	1,584 (100%)	2,030 (100%)

Average Annual Earnings (Constant Dollar). To achieve an acceptable distribution on the earnings variable for the ANOVA equation, it was necessary to delete the 37 cases representing the highest 1% earners, who reported mean earnings ranging from \$127, 992 to the NLSY high coded at \$909,700. The skew for the earnings variable prior to the deletion of these 37 cases was 11.3 for the mean of constant dollar earnings and 4.7 for the square root of the mean of constant dollar earnings. After deleting these 37 cases, the skew was 1.54 for the mean

of constant dollar earnings and .52 for the square root of the mean of constant dollar earnings. (Table 6)

Predictably, the characteristics of these 37 deleted cases were unlike the overall sample, in that the average annual earnings (\$454,521), education (16.1 years), and accumulated weeks of work experience (980) were much higher than the rest of the sample. They were also more likely to be male (84%) and white (73%) with *No Auto Disadvantage* (95%).

Subsequent to deleting these cases, the adjusted mean constant dollar earnings from 1990 to 2000 was \$32,662, which ranged from a high of \$126,593 to a low of \$305, with the lowest 25% of the earners reporting an average annual earning of \$19,714 or less. (See Table 6) The highest 25% of earners reported average annual earnings of \$41,103 or more.

Hours Employed. Mean average hours employed from 1990 to 2000 was 2,166 hours. The mean hours employed ranged from the first and second highest number of hours reported as 6,296 and 4,652 hours respectively, to the two lowest numbers of hours worked reported as 396 and 497 hours.

In this sample the 25% of the workers with the least number of labor hours worked 1,944 hours a year or less, and the busiest 25% of workers labored 2,391 hours or more. Considering that full-time would be approximately 1,750, or 35 hours x 50 weeks (US Census, 2003), more than three quarters of the sample were working full-time or more.

Years Parenting. The majority of the participants reported parenting for more than half the years under study, with 2,139 (59%) reporting 5 to 8 years of parenting and 1,475 (40.8%) reporting 0 to 4 years of parenting.

Residence. The participants predominately resided in urban, as opposed to rural areas, with 79% (n= 2,874) residing in urban areas for a period of more than half the years examined in this study.

In summary, the descriptive statistics are consistent with the current transportation literature, in that blacks report a higher proportion of autolessness than non-blacks; and the sub-sample of participants of all races in the workforce report higher rates of auto ownership than the general NLSY sample.

6.2. Bivariate Relationships

6.2.1. Central Study Variables

The interrelationships among the study's central variables are present in Tables 9 and 10. Pearson's correlation is reported for the continuous variables in Table 9, and Spearman's rho is reported for those not normally distributed, as well as the dichotomous variables in Table 10.

Human capital research has established that education and work experience are positively correlated with the earnings variables (Sweetland, 1996). Racial and gender differences in earnings have long been established (Cohen, 2000) and consequently, these wage disparities, coupled with a women's parenting and marital status powerfully impact poverty status (Christopher, England, Smeeding, & Phillips, 2002). Indeed, parenting among both married and single women was expected to be negatively correlated to women's earnings, though not necessarily to the earnings of men (Waldfogel, 1998). It was also expected that there would be a high negative correlation between *Years Without Auto* and the two dependent variables.

Indeed, the expected negative point biserial correlation between the female gender and both mean constant-dollar earnings ($r_{pb} = -.29$; $p \leq .001$) and average annual hours employed ($r_{pb} = -$

.33; $p \leq .001$) was found in this sample. Likewise, the positive relationship between race or being Non-Hispanic/Non-Black was present with both earnings ($r = .13$; $p \leq .001$) and hours employed ($r = .07$; $p \leq .001$). (Table 10)

Furthermore, as expected there was a positive correlation between the human capital variables with both the earnings and hours employed variables. *Weeks Work Experience* was positively correlated with both earnings ($r = .34$; $p \leq .001$) and hours employed ($r = .31$; $p \leq .001$). Likewise, *Education Attainment* was positively correlated with both earnings ($r = .36$; $p \leq .001$) and hours employed ($r = .08$; $p \leq .001$). (Table 9)

Although there was not a significant correlation reported between average annual constant-dollar earnings and *Years Parenting*, this was only because the relationship was masked by gender differences, previously noted by Waldfogel (1998). Consistent with her research in labor economics, the current study found a positive correlation between men's earnings and *Years Parenting* ($r = .22$; $p \leq .001$), but this relationship is negative for women ($r = -.24$; $p \leq .001$). These two relationships in the opposite direction cancelled each other out in the combined analysis.

The number of years without auto ownership was negatively correlated to earnings ($r = -.18$; $p \leq .001$) and hours employed ($r = -.11$; $p \leq .001$). In addition, there was a positive relationship between the number of years living in an urban, as opposed to a rural area, with earnings ($r = .12$; $p \leq .001$), but residing in a urban setting had no significant relationship with the number of hours employed. (Table 10)

Table 9. Bivariate Relationships on Transformed Variables (Pearson's correlation)
Males & Females in the Work Force

(N=3,614)

	Earnings	Work Experience	Educ.	Hours Employ	Married
Mean Annual Earnings	---	.34***	.36***	.51***	.22***
Mean Annual Hours Employed	.51***	.31***	.08***	---	.09***
Work Experience since age 21	.34***	---	.05**	.31***	.19***
Education	.36***	.05**	---	.08***	.05**
Years Married	.22***	.19***	.05**	.09***	---

p ≤ .05*

p ≤ .01**

p ≤ .001***

Table 10. Bivariate Relationships (Spearman's rho correlation)
Males & Females in the Work Force

(N=3,614)

	Earnings	Work Experience	Educ	Hours Employ	Years No Auto	Married
Race	.13***	.09***	.11***	.07***	-.18***	.16***
Hispanic = 1 Black = 2 White = 3						
Gender	-.29***	-.05**	.13***	-.33***	-.02	-.07***
Male = 1 Female = 2						
Years No Auto Ownership	-.18***	-.15***	-.09***	-.11***	---	-.34***
Years Parenting	-.29	.08***	-.12***	-.05**	-.15***	.49***
Years Urban (Not-Rural) Residence	.12***	.02	.13***	-.005	.07***	-.09***

$p \leq .05^*$
 $p \leq .01^{**}$
 $p \leq .001^{***}$

6.2.2. Cross-Tab on Auto Ownership by Race /Gender

On the sample of all participants with complete data (N=7,079), the results of a simple 3 x 4 cross-tab on race and auto ownership indicated that minorities, particularly African Americans, were significantly more likely than Non-Hispanic/Non-Blacks to experience a greater number of years without auto ownership ($\chi^2 = 1,127.58$; $df = 6$; $p \leq .001$). According to Cohen's interpretation, the effect size of race on long-term autolessness is medium (Cramer's $V = .28$; $p \leq .001$) (Morgan, Griego, Gloeckner, 2001).

The expected amount of the total number of 2,110 African Americans with uninterrupted auto ownership was 1,369 (65%) compared to the actual count of 864 (41%). The similar respective figures for Whites (N=3,670) and Hispanics (N=1,299) were an expected number with uninterrupted auto ownership of 2,382 (65%) and 843 (65%), compared to an actual count of 2,908 (79%) and 822 (63%), respectively.

Likewise, on the sample limited to participants in the workforce (N=3,614), the results of a simple 3 x 4 cross-tab on race and auto ownership indicated only African Americans, were significantly more likely to report a greater number of years without auto ownership ($\chi^2 = 288.92$; $df = 6$; $p \leq .001$). According to Cohen's interpretation, the effect size of race on long-term autolessness among those in the workforce is between medium and small (Cramer's $V = .20$; $p \leq .001$) (Morgan, Griego, Gloeckner, 2001).

The expected amount of the total number of 909 African Americans with uninterrupted auto ownership was 690 (76%) compared to the actual count of 524 (58%). The similar respective figures for Whites (N=2,081) and Hispanics (N=624) were an expected number with uninterrupted auto ownership of 1,579 (76%) and 473 (76%), compared to an actual count of 1,743 (84%) and 475 (76%), respectively.

An additional 2 x 4 cross-tab on gender and auto ownership for both the general sample (N =7,079) and the sample limited to participants in the workforce (N= 3,614), revealed that females were not significantly more likely than males to experience higher rates of long-term autolessness.

6.3. ANOVA Results: Mean Annual Constant Dollar Earnings 1990-2000

An ANOVA was conducted to test the impact of auto ownership on earnings after controlling for the covariates of work experience, education, years married and urban residence. The four-way factorial analysis of variance tested the interaction effects of autolessness with race, gender, and parenting. Table 11 presents the ANCOVA results, including all of the main effects. In the interest of conciseness, this table is limited to only the significant interaction effects related to auto ownership.

In support of the hypothesis, there was indeed a significant, albeit small, impact from the participant's number of years of auto ownership on their earnings $F(3, 3,562)=7.62$; $p < .001$; partial η squared = .006. Providing further support for the hypothesis, there is a significant interaction effect between the participant's number of years of auto ownership and their race $F(6, 3,562)=6.63$; $p < .001$; partial η squared = .011. In fact, this "Race x Auto" interaction effect, which contributes to 1.1% of the variance in earnings, is almost twice as large as the effect of auto ownership alone.

Table 11. ANCOVA Summary Table for Earnings

Source	SS	df	MS	F	p	η squared
Auto Model	3,479,629.8	51	68,228.04	46.74	< .001	
Work Experience	498,680.9	1	498,680.9	341.62	< .001	.088
Education	927,753.6	1	927,753.6	635.56	< .001	.151
Married	35,645.6	1	35,645.6	24.42	< .001	.007
Urban Residence	68,965.1	1	68,965.1	47.25	< .001	.013
Auto Ownership	33,358.2	3	11,119.4	7.62	< .001	.006
Parenting	1,434.7	1	1,434.7	.98	.322	.000
Race	62,495.6	2	31,247.8	21.41	< .001	.012
Gender	731,767.2	1	731,767.2	501.30	< .001	.123
Auto Ownership X Race	58,067.6	6	9,677.9	6.63	< .001	.011

Mean Annual Constant Dollar Earnings 1990-2000

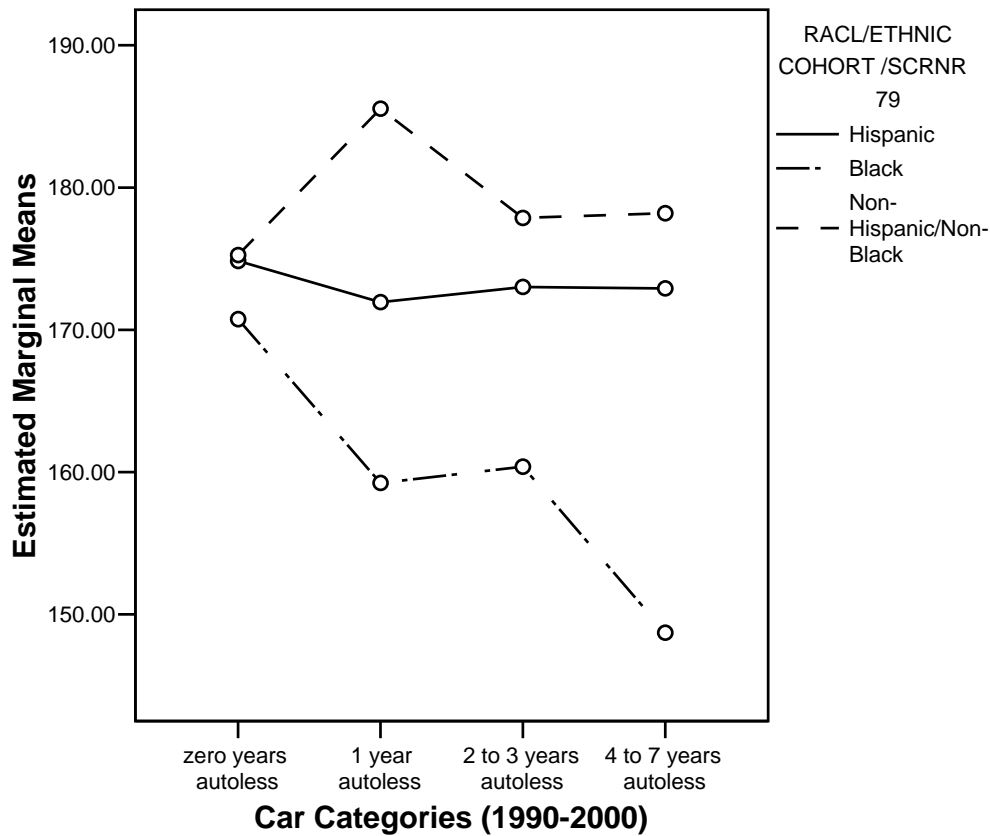


Figure 1. Earnings by Auto Ownership and Race

As demonstrated in Figure 1, African American's with the fewest years of auto ownership reported a much greater decline in earnings than autoless workers from other races. Indeed, while there was little within-race variation in earnings among Hispanics and Whites with the highest and lowest number of years of auto ownership, African Americans with uninterrupted auto ownership had mean earnings of \$29,152, compared to mean earnings of \$22,115 reported by those with the fewest years of auto ownership.

Although the Race x Auto x Gender three-way interaction was not significant at the $p = .005$ level, it is important to note there are important gender differences masked in the racial analysis. Figure 2 demonstrates that among males, only African American's earnings display a consistent downward trend, which steadily declines with an increase in the number of years of autolessness. The earning patterns for Hispanic and White males fail to conform to the expected pattern, with earnings increases reported among those with the least years of auto ownerships. This may in part be attributed to the small number of males both Hispanic ($N=15$) and White ($N=17$) in the sample with Very High Auto Disadvantage.

Mean Annual Constant Dollar Earnings 1990-2000

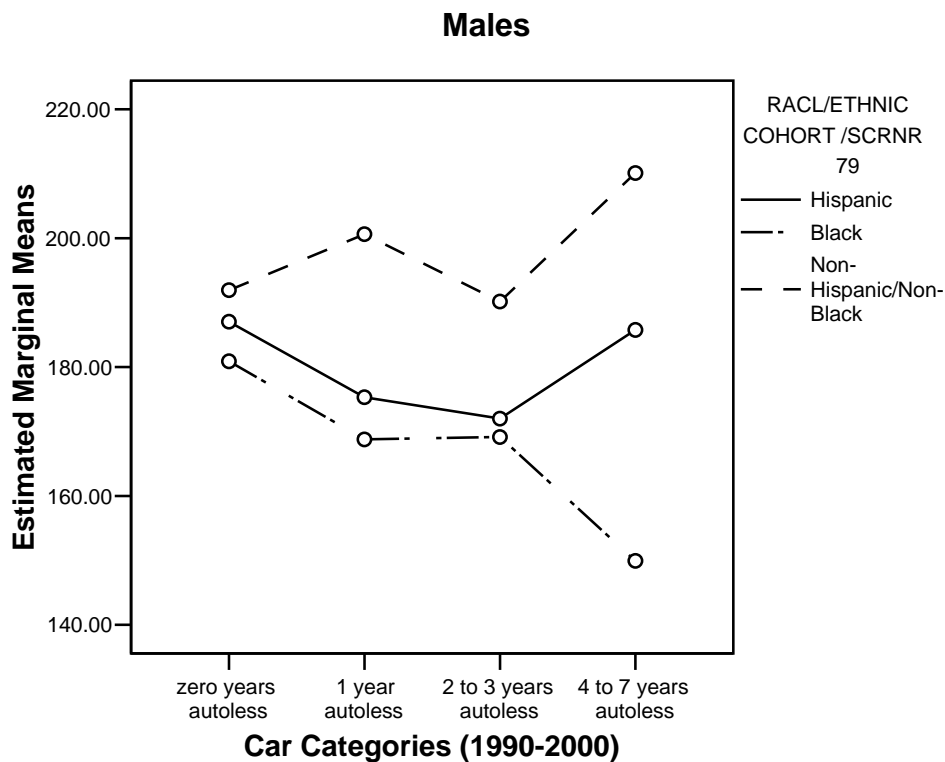


Figure 2. Male Earnings by Auto Ownership and Race

Nonetheless, upon examining the female's earnings in Figure 3 the study's hypothesis is somewhat confirmed in that, unlike males, females with the highest levels of auto disadvantage report earnings lower than those with no auto disadvantage. Although this decline in earnings is consistent for females of all races, it is strongest among white females, rather than African American females. African American females with uninterrupted auto ownership had mean earnings of \$25,787, compared to mean earnings of \$21,757 reported by those with the fewest years of auto ownership. This \$4,030 decline in black female's earnings is less than the decline in earnings for white

Mean Annual Constant Dollar Earnings 1990-2000

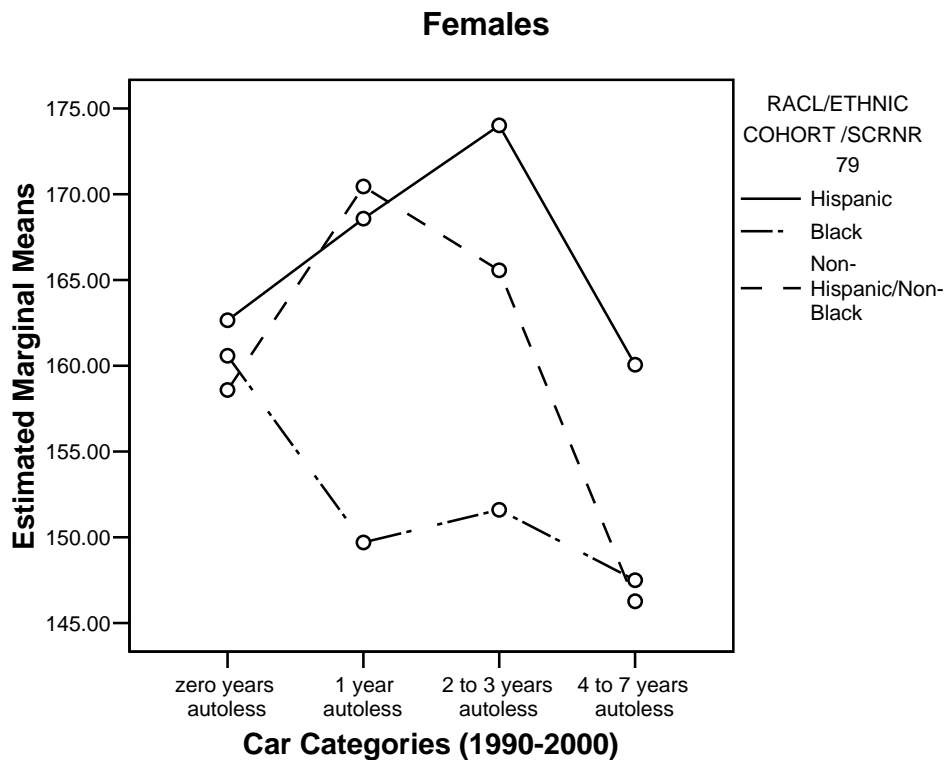


Figure 3. Female Earnings by Auto Ownership and Race

females (\$7,695), but more than the decline for Hispanic females (\$836) from the highest to the lowest auto ownership categories. Note that black female's earnings exhibit a steadier decline with increased autolessness and appear to be impacted earlier at lower levels of autolessness, whereas other females are not impacted until plunging to the highest levels of auto disadvantage. Recall that earnings were transformed to the square root of earnings for the ANOVA, but for easier interpretation, Table 12 presents the mean constant dollar earnings from 1990 to 2000 in straightforward dollars.

**Table 12. Adjusted and unadjusted Group Means for Constant Dollar Earnings
(1990-2000)**

Auto Ownership	RACE	GENDER	Covariate Adjusted Mean	Unadjusted Mean
No Auto Disadvantage	Hispanic	Male	\$34,982.84	\$35,362.80
		Female	\$26,455.35	\$26,273.17
	Black	Male	\$32,725.90	\$32,815.32
		Female	\$25,786.58	\$25,446.63
	Non-Hispanic Non-Black	Male	\$36,837.12	\$38,537.62
		Female	\$25,149.20	\$25,510.48
Low Auto Disadvantage	Hispanic	Male	\$30,733.95	\$29,835.65
		Female	\$28,416.86	\$25,548.83
	Black	Male	\$28,485.00	\$26,357.52
		Female	\$22,409.79	\$20,756.16
	Non-Hispanic Non-Black	Male	\$40,250.39	\$38,005.50
		Female	\$29,053.54	\$28,490.06
High Auto Disadvantage	Hispanic	Male	\$29,585.72	\$26,001.56
		Female	\$30,280.18	\$26,627.71
	Black	Male	\$28,612.06	\$24,674.13
		Female	\$22,983.17	\$19,622.41
	Non-Hispanic Non-Black	Male	\$36,161.97	\$35,807.99
		Female	\$27,411.44	\$29,535.86
Very High Auto Disadvantage	Hispanic	Male	\$34,506.41	\$26,218.09
		Female	\$25,619.20	\$23,525.42
	Black	Male	\$22,478.11	\$14,407.20
		Female	\$21,756.84	\$16,610.05
	Non-Hispanic Non-Black	Male	\$44,146.63	\$34,662.99
		Female	\$21,394.62	\$25,373.30

As noted earlier, because of the opposite impact of parenting on the earnings of males and females, the ANCOVA detected no significant contribution from the number of years parenting on earnings. However, contrary to the hypothesis, the ANOVA results did not provide evidence of the expected significant contribution from three-way interaction term “Auto x Gender x Parenting” or the four-way interaction term “Auto x Gender x Parenting x Race”.

6.3.1. Summary of Earnings ANOVA

In summary, the ANOVA on earnings did support the hypothesis that the lack of a vehicle is related to earnings reductions after controlling for human capital and demographics. The significant two-way Auto x Race interaction in the ANOVA on earnings indicates that African American participant’s earnings were most significantly impacted by autolessness.

Although there was no significant Auto x Gender interaction, some evidence was offered to indicate that the lack of a vehicle is generally related to greater earnings reductions for female’s than males, with of course the exception of African American males who experience greater earnings reductions with autolessness than other males or females.

There was no support for the hypothesized interaction between auto ownership and parenting on female’s earnings. There was no evidence that the earnings of females with higher years parenting were impacted by autolessness significantly more than the earnings of females with fewer years parenting.

6.4. ANOVA Results: Mean Annual Hours Employed 1990-2000

An ANOVA was conducted to test the impact of auto ownership on hours employed after controlling for the covariates of work experience, education, years married and urban residence. The four-way factorial analysis of variance tested the interaction effects of autolessness with race, gender, and parenting. Table 13 presents the ANCOVA results, including all of the main effects. To limit the size and complexity, this table is limited to only the significant interaction effects related to auto ownership.

In support of the hypothesis, there was indeed a significant impact from the participant's number of years of auto ownership on their hours employed $F(3, 3,335)=11.10$; $p < .001$; partial $\eta^2 = .010$.

Table 13. ANCOVA Summary Table for Hours Employed

Source	SS	df	MS	F	p	η^2 squared
Auto Ownership Model	183,075,470	51	3,589,715	20.76	< .001	
Work Experience	49,124,865	1	49,124,865	284.07	< .001	.078
Education	4,345,944	1	4,345,944	25.13	< .001	.007
Married	6,635	1	6,635	.038	.845	< .001
Urban Residence	454,714	1	454,714	2.63	< .105	.001
Auto Ownership	5,759,661	3	1,919,887	11.10	< .001	.010
Parenting	1,696,822	1	1,696,822	9.81	.002	.003
Race	238,340	2	238,340	.69	.502	<.001
Gender	61,004,092	1	61,004,092	352.76	< .001	.096
Auto Ownership X Gender	1,752,061	3	584,020	3.38	.018	.003
Auto Ownership X Gender X Race	2,694,297	6	449,050	2.60	.016	.005
Auto Ownership X Gender X Parenting	1,940,342	3	646,781	3.74	.011	.003

There is a significant interaction effect between the participant's number of years of auto ownership and their gender on hours employed, but this relationship is moderated by both race and parenting. The three-way "Auto x Gender x Race" interaction $F(6, 3,335)=2.60$; $p=.016$; partial $\eta^2=.005$), which impacts hours employed, is not dissimilar to that found in the previous earnings ANOVA. Findings indicate that autolessness impacted African American males' employment outcomes, in this case hours employed, more strongly than autolessness impacted the hours employed for any other racial or gender group. As displayed in Figure 5, across all racial categories the hours employed are higher for males with more years auto

Mean Annual Hours Employed (1990-2000)

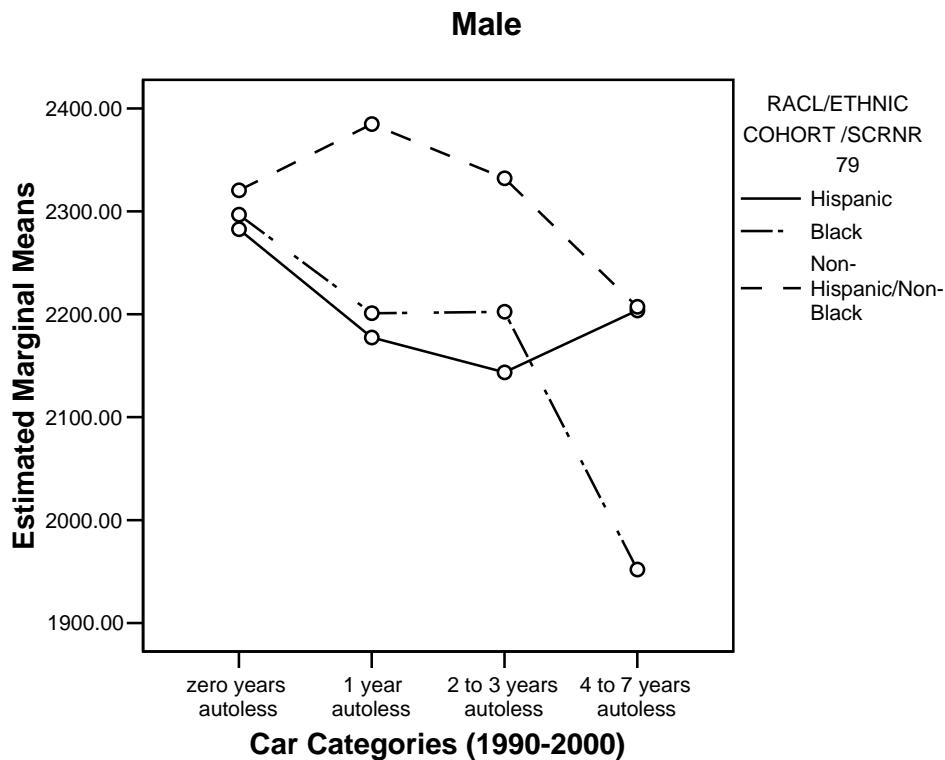


Figure 4. Male Hours Employed by Auto Ownership and Race

ownership, as compared to the hours employed for males with the least years of auto ownership. However, clearly African American males' hours are most sensitive to autolessness, with their mean hours steadily decreasing from 2,297 to 1,952 hours employed.

Nonetheless, as displayed in Figure 5, this pattern is not as clear among females. Consistent with the general population, among the females in this sample white females tend to work fewer hours than African American or Hispanic females (Sinzoak & Williams, 2005).

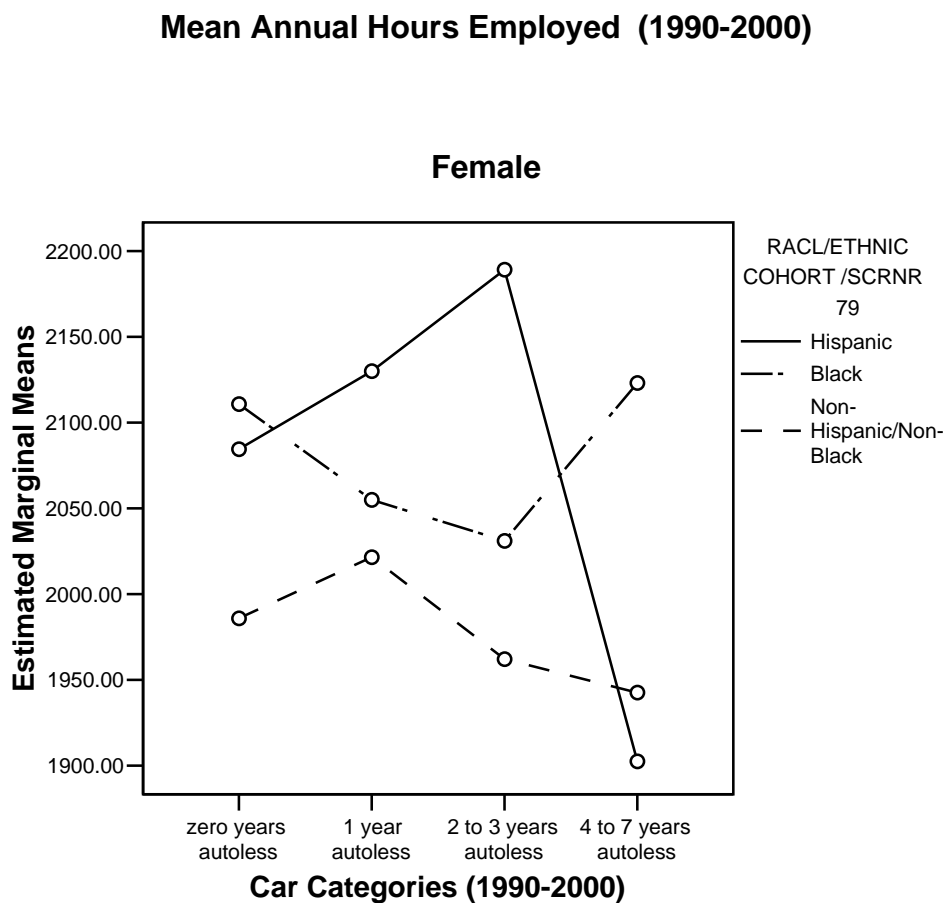


Figure 5. Female Hours Employed by Auto Ownership and Race

However, contrary to the study's hypothesis, the number of hours that African American females' are employed appear to be less sensitive to autolessness than the hours of either Hispanic or White females. Indeed, the African American females with the highest number of years without an auto actually experience a sharp increase in hours employed. Perhaps this is directly related to the lower earnings that accompany autolessness, which was previously noted. It may be that African American females without autos increase their hours of employment in an attempt to recover a portion of these reduced wages.

Another noteworthy pattern is the impact of auto ownership on the hours of Hispanic females. Hispanic females report a reduction in work hours only at the highest level of autolessness, but then report a dramatic and unprecedented plunge. Nonetheless, the mean annual hours employed among females, even in the highest autolessness category, never falls below full-time full-year, defined as 1,820 hours (52 weeks x 35 hours).

The three-way Auto x Gender x Parenting interaction $F(3, 3,335)=3.74$; $p=.011$; partial $\eta^2=.003$, which impacts hours employed, provides evidence to support the hypothesis that the employment hours of females with more years parenting are reduced by autolessness more than that of females with fewer years parenting (Figure 6) and males (Figure 7). Females with higher years parenting report a plunge in hours of employment compared to the relatively stable employment hours of females with fewer years parenting, as evidenced in Figure 6.

Mean Annual Hours Employed (1990-2000)

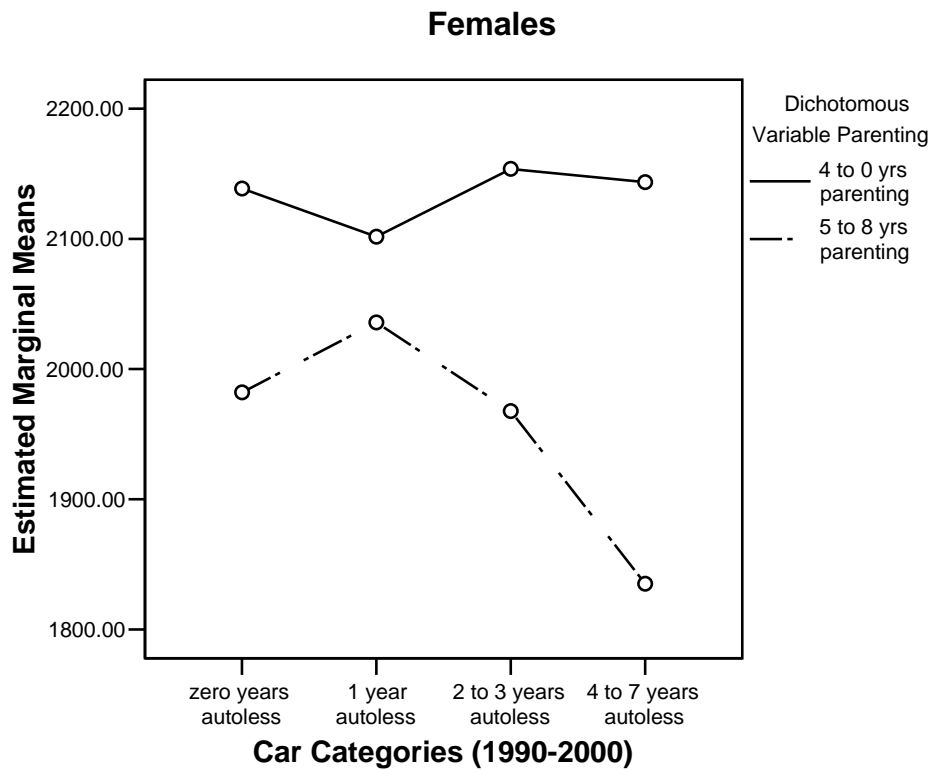


Figure 6. Female Hours Employed by Auto Ownership and Parenting

Figure 7 indicates that the work hours of men with higher years parenting are not impacted as strongly as those of females, which is consistent with the hypothesis. In fact, just the opposite is true, in that autolessness among males with greater years parenting coincides in a reduction in work hours that is considerably less than the reduction reported by males with fewer years parenting.

Mean Annual Hours Employed (1990-2000)

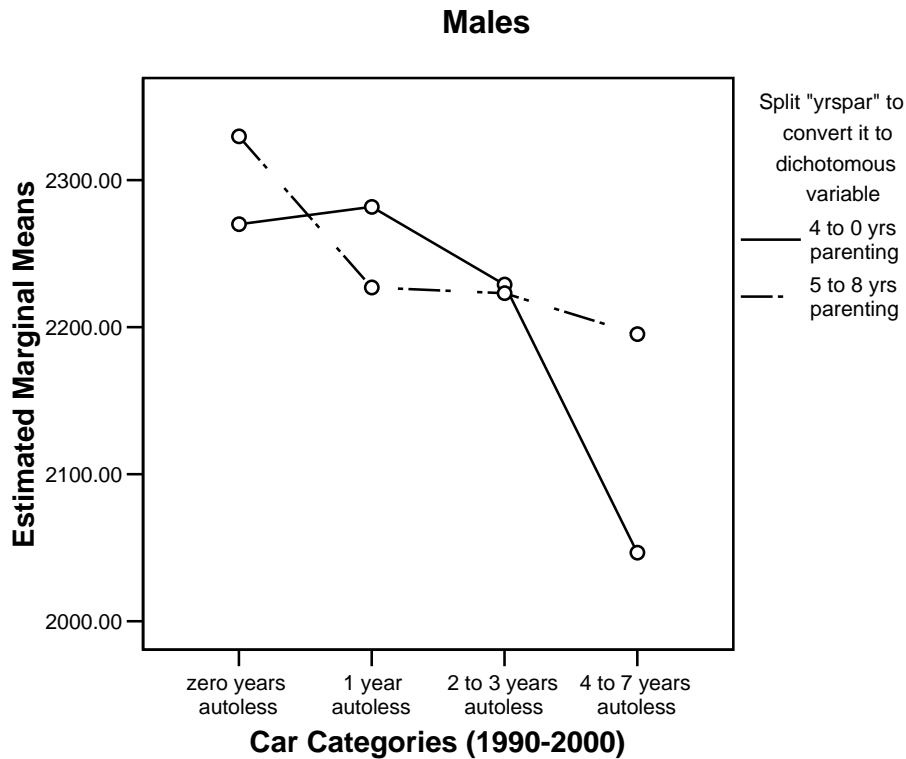


Figure 7. Male Hours Employed by Auto Ownership and Parenting

Figure 6 and 7 together demonstrate the gender disparity in the impact of autolessness on individuals with the most years parenting. Parenting females reported a high of 2,036 hours of employment for those with only one year of autolessness and a low of 1,835 hours of employment among those with 4 to 7 years of autolessness, compared to parenting males' 2,300 hours and 2,195 hours, respectively. This represents an average annual reduction in employment time for females of 201 hours, which is nearly double the 105 hour reduction for males.

Nonetheless, there was no evidence to support the hypothesis that African American females lacking a vehicle and reporting the highest years parenting experienced a greater reduction in hours employed than similarly situated white or Hispanic females.

6.4.1. Summary of Hours Employed ANOVA

In summary, the ANOVA on the mean annual hours employed did support the hypothesis that the lack of a vehicle is related to work hour reductions after controlling for human capital and demographics. However, contrary to the hypothesis this impact is most evident among African American males rather than females, although both female and male whites also experienced a decline in work hours with reduced auto ownership. The impact of autolessness on the work hours of Hispanics was inconclusive. Contrary to the hypothesis, African American females reported increased hours of employment with the highest level of autolessness, which may be an attempt to compensate for the lower wages resulting from lack of an auto.

In addition, the significant three-way Auto x Gender x Parenting interaction supported the hypothesized moderating impact of gender and parenting upon the relationship between auto ownership and hours employed. Females with the highest years parenting reported the largest reductions in work hours, compared to both high parenting males and females parenting relatively fewer years. However, inconsistent with the hypothesis, there was no evidence to indicate this relationship was strongest among African American females, in comparison to white or Hispanic females.

6.5. Supplemental Analysis to Address Potential Directional Difficulties

A common concern among scholars studying the impact of auto ownership on employment outcomes is a potential timing problem. Is it the lack of an auto that causes reduced earnings, or are reduced earnings causing a lack of an auto? In an attempt to address this concern which is predominately raised in relation to earnings, rather than hours employed, a second and different methodology was applied to the primary variables. To most directly confront the theoretical issue, this supplemental analysis was limited to only the earnings dependent variable.

A within subject comparison was conducted on participants who reported at least one year without an auto before achieving and maintaining steady auto ownership throughout the rest of the decade. A within subject comparison of this nature controls logically rather than statistically for the demographic and education variables, as the earnings of the same individual is being compared to him/her self at time 1 (without an auto) and time 2 (after achieving steady auto ownership).

There were 175 cases in which a respondent who reported being autoless for at least one period in the study, subsequently obtained and maintained auto-ownership throughout the remainder of the study period. Results of a paired-sample *t* test comparing mean constant dollar earnings before (\$22,541) and after (\$28,525) auto ownership stability was achieved, indicates there is a statistically significant difference ($t(174) = 7.543$; $p < .001$). Calculating the $d = .572$, permits us to use Cohen's evaluation of the size of the effect of steady auto ownership on earnings, which in this case the 25.5% earnings increase is considered medium (Morgan et al, 2001).

This within subject comparison was repeated separately for the males ($N=86$) and females ($N=89$) in the sample. Steady auto ownership had a higher effect on the earnings of males ($t(85) = 5.721$; $d = .621$; $p < .001$) than the earnings of females ($t(88) = 5.017$; $d = .535$; $p < .001$). Females experienced a 22% increase in earnings, between their mean earnings before (\$20,717) and after (\$25,367) attaining steady auto ownership, compared to a 30% increase for male's difference in mean earnings before (\$24,429) and after (\$31,794) attaining steady auto ownership.

In addition, the within subject comparison was conducted separately for the Hispanics ($N=37$), African Americans ($N=73$) and Whites ($N=65$) in the sample. Steady auto ownership had the highest effect on the earnings of Hispanics ($t(36) = 5.502$; $d = .917$; $p < .001$) as opposed to either Whites ($t(64) = 4.712$; $d = .589$; $p < .001$) or African Americans ($t(72) = 3.578$; $d = .422$; $p = .001$). Hispanics reported a 37% increase in earnings between their mean earnings before (\$21,970) and after (\$30,094) attaining steady auto ownership, compared to an increase of 29% and 19% among Whites and African Americans, respectively.

Although these are relatively small samples, this within subject comparison is a powerful analytic tool to address the theoretical issue and provide support for the model's presumed direction that a lack of auto ownership influences reduced employment outcomes. It is curious that these findings were not consistent with those of the study's primary analysis, in that in the earnings ANOVA indicated that African Americans exhibited the highest effect from auto ownership. However, this may be attributed to the truncated sample. In addition, the 73 African Americans in this sample were comprised of only 30 males ($t(29) = 3.223$; $d = .599$; $p < .003$), and 43 females ($t(42) = 2.110$; $d = .326$; $p < .041$), which somewhat blunted the overall impact.

Recall that the significant ANOVA 2-way Auto x Race interaction on earnings was most pronounced among African American males. However, even after isolating the black male's 23% earnings increase from the more modest 16% increase reported by black females in the secondary within subject comparison, it is still considerably lower than the 29% increase reported among whites. Further research would be required to identify other differences in the samples, which may be contributing to the racial variations between the secondary and primary analyses. Since the goal of the current secondary analysis was simply to support the model's direction, such research is not presented in this dissertation.

Overall Summary of Findings

The finding related to the first analysis examining of the persistence and prevalence of autolessness throughout the decade between 1990 to 2000 provided clear evidence that African Americans enjoy uninterrupted vehicle access at rates only half that of Non-Blacks/Non-Hispanics. While 81% of white females benefit from uninterrupted vehicle access throughout the decade, only 41% of African American females are similarly situated. Likewise, among males 77% of white males compared to only 41% of black males reported steady auto access. Furthermore, 31% of black females and 35% of black males lacked a vehicle for more than half of the years examined.

The results of the ANOVA indicate that auto ownership has a small but significant contribution to both earnings and hours employed after controlling for human capital and demographic characteristics. The within subject comparison indicated an overall 25.5% increase between mean constant dollar earnings prior to stable auto ownership (\$22,541) compared to earnings after attaining auto stability (\$28, 525).

The significant two-way Auto x Race interaction in the ANOVA on earnings indicates that African American male participant's earnings are most significantly impacted by autolessness. However, female earnings, particularly black females, also followed a general pattern of decline with higher levels of autolessness.

Likewise, the significant three-way Auto x Race x Gender interaction in the ANOVA on hours employed indicates African American male's hours of employment decline significantly more than those of other males or females with increased autolessness. An unexpected finding in this analysis was that among African American females with the highest levels of autolessness there was an increase in hours employed, which maybe an attempt to compensate for their reduced earnings. Nevertheless, black females lacking automobiles work significantly greater hours than white females, for similar earnings.

In addition, the significant three-way Auto x Gender x Parenting interaction in the ANOVA on hours employed supported the hypothesis that females with many years parenting and high levels of autolessness experience significantly greater reductions in their hours employed than all males and females parenting fewer years.

Evidence was also provided by the within subject comparisons of participant's earnings before and after attaining consecutive years of steady auto ownership that auto ownership significantly impacted the earnings of both males and females. This analysis also confirmed that this relationship was significant for participants of each of the three racial groups. Significantly higher earnings ranging anywhere from 16% to 37% were reported after achieving steady auto ownership in the within subject analyses.

7. DISCUSSION

7.1. Discussion of the Results in Context of Prior Research & Central Theories

The study's first analysis, the longitudinal examination of the persistence & prevalence autolessness, provides some of the first documented insights into auto ownership patterns, and provides more depth and breath than the previous cross-sectional snapshots. Whereas the last US Census (2000) reported auto ownership in 2000 at the rate of 92% for white households, compared to 83% for Hispanic and 76% for African American households, this analysis indicates that sustained auto ownership for over a ten-year period may be considerably less than these figures. Even among this sample of participants in the workforce, presumably a relatively more advantaged population by virtue of their employment status, the approximate rates for uninterrupted auto ownership throughout the last decade were 85%, 75% and 55% for whites, Hispanics and blacks, respectively.

In addition, the "welfare-fixation" present in most of the recent transportation studies tends to emphasize transportation problems as the domain of poor "welfare mothers" (Fletcher et al, 2002; Kawabata, 2002; Ong, 2002, Sanchez et al, 2003). The established impact of auto ownership on the employment outcomes among this extensive national sample, which has excluded those not in the workforce at least 9 months every year from 1990 to 2000, by definition omitted the most economically disadvantaged individuals. In addition, this study's descriptive statistics indicated that among blacks and whites it is males more so than females, that are less likely to have steady auto ownership and more likely to experience the highest levels of autolessness. Although the cross-tab indicated that gender was not a significant determinant

in the likelihood of vehicle ownership, it is critical to be aware that the rates of male autolessness are equal to or greater than the rates of female autolessness. This serves to securely places the issue of the impact of auto ownership and transportation on employment outcomes beyond the exclusive confines of the just the “poor” or just “women”.

Indeed the greater impact of autolessness on the employment outcomes of males, in comparison to females, was an unexpected finding of the current study. However, this is logical when considering the greater variation in the earnings of males, who have higher potential earnings than females. Females, due to the restraints on their earnings in general, have less variation in earnings. Therefore, the impact of autolessness reduces earnings that are already relatively lower than those of males. In addition, occupation segregation patterns may limit females to more stationary albeit lower waged jobs.

Once again, in relation to prior research, another major contribution of the current study is that it serves to validate the important research on the impact of transportation on welfare recipient’s employment outcomes by establishing that those finding are somewhat consistent with those in the general population. (Fletcher et al, 2002; Kawabata, 2002; Ong, 2002, Sanchez et al, 2003). Thereby, this study established that autolessness and its negative impact upon employment outcomes is not particular to any personal faults relative to the sample of welfare recipients.

The study’s findings that vehicle ownership had a statistically significant relationship to employment outcomes solidly support both Kain’s Spatial Mismatch Theory and Sherraden’s Theory of Welfare Based on Assets, with somewhat less support for the Work-Family-Fit Model. Once again, the ANOVA findings among this sample limited to participants in the labor force,

clearly demonstrates the significant role of race, which challenges recent presumptions that Kain's spatial mismatch is more of a class divide than racial divide (Fletcher, 2002).

As posited by Kain (1992, 1968), the ANOVA results clearly indicate that auto ownership had a more significant impact on the employment outcomes of African Americans than those of the white participants and the limited number of Hispanics in the sample. The earnings of African American males and females declined in specific patterns with increased levels of autolessness that portrayed a distinct and steady downward slope different from those of whites and Hispanics.

In addition, when considering work hours among males, only African Americans report significant declines in work hours as autolessness increases. Black women's work hours actually increase at the highest levels of autolessness. However, the analysis detected a unique and disturbing pattern among black females. The decline in earnings among the most auto disadvantaged African American females was accompanied by an increase in hours worked. Therefore, black females lacking vehicles for 4 to 7 years, reported with the lowest mean earnings (\$21, 757), but an annual mean work effort of 2,123 hours, which surpassed the 1,986 to 2,111 mean hours reported by females with continuous auto ownership, whose mean earnings ranged from \$25,149 to \$26,455.

Clearly the study's findings provides evidence to support Kain's Spatial Mismatch Theory that points to the geographic difference between the locations of the segregated residence of African Americans and the employment sectors as the reason a lack of vehicle significantly compromises employment outcomes.

Sherraden's Theory of Welfare Based on Assets is also supported by the study's findings. The findings confirmed the role of the automobile as a critical asset for assuring optimum

employment outcomes, particularly for African Americans. However, as demonstrated by the ANOVASs, and more so by the within subject comparisons in the final analytical section, auto ownership is what Sherraden (1991) would term a critical ‘threshold asset’ which maximizes the impact of human capital and work effort for all races and both genders.

The support for the Work-Family-Fit model was somewhat weaker. There was no evidence of the hypothesized significant, three-way, Auto x Gender x Parenting interaction on earnings. However, there was a significant three-way Auto x Gender x Parenting interaction on hours worked, which demonstrated that females lacking autos and parenting more years reported reduced work hours than similarly situated females parenting fewer years. As expected, males parenting many years and lacking autos many years did not display this same pattern of reduced work hours, making it a unique parenting penalty to females. The Work-Family-Fit model would posit that combining female’s parenting demands with autolessness results in exacerbated time restraints, which leaves less time available for paid employment (Debord et al, 2000).

7.2. Implications for Social Work Practice

The major tenets of the study’s hypothesis were confirmed. After controlling for education work experience and demographic characteristics, the lack of auto ownership was negatively related to employment outcomes. According to the ANOVA results, this relationship was strongest among African Americans for both earnings and hours employed and strongest among females reporting the highest years of parenting for only the dependent variable hours employed. There was no evidence that African American mothers were more strongly impacted than white or Hispanic mothers.

However, just as African Americans are more likely to report significantly poorer employment outcomes when lacking an auto, they are also over 600% more likely than whites to experience the highest levels of auto deprivation. In this era with an emphasis on ‘personal responsibility’ accompanied by shifting supports for social services and income maintenance programs toward workforce attachment, there are important social work implications to these findings.

From a social work perspective, there are three basic intervention strategies to work toward improved transportation equity. Social workers can respond to the economic, racial, and social exclusion resulting from transportation disadvantage by advocating for auto ownership supports, promoting improvements in mobility services, or championing integrative development patterns within communities.

The following discussion related to these three interventions will primarily focus upon solutions for society’s most economically vulnerable groups, because they are most likely to be encountered within social work occupations, and least likely to be able to absorb the negative consequences of transportation disadvantage. Nevertheless, this study clearly acknowledges that the issue of transportation equity has much broader implications for the general population.

7.2.1. Auto Ownership Supports

Sherraden’s theory can be understood to posit that actual ownership of an automobile would offer employment outcomes superior to transportation services. In fact, in some regions initial program assessments have indicated that car ownership programs have been a more successful strategy as a journey to work intervention than group transportation efforts or mobility services (Wilder Research Center, 2001). However, program administrators quickly acknowledge

that auto ownership programs are not a panacea that can eliminate the need for public transit (Wilder Research Center, 2001) and in nearly every city and county where these programs operate, group transportation services operate simultaneously (CTAA, 2000). One innovative program assisted TANF recipients in auto ownership and trained them in operating their own mobility services for low-income people (Applied Management & Planning Group, 1999).

States such as Georgia (\$10 million) and Arizona (\$2.4 million) have chosen to invest some of the “savings” from shrinking TANF enrollments into auto ownership programs (PortJOBS, 2001). The Pennsylvania Department of Public Welfare offers \$750 for auto purchases and \$250 for auto repairs to a limited number of eligible TANF recipients (National Economic Development & Law Center, 2000). However, the number of families assisted by auto ownership support programs has been relatively small with the largest and most promising programs all together placing an annual total of approximately 2,700 autos with clients for an average cost of \$1,100 (PortJOBS, 2001). In addition, a number of the programs have been criticized for racial bias in the distribution of their limited resources (Sinha, 2002).

A typical program example with the key components for success is Wheel Get There Two, which operates in nine counties in South Central Minnesota. Low cost auto loans were available through Wells Fargo Bank to public assistant recipients who had completed car maintenance and money management classes. Vehicles eligible for purchase receive an inspection by a certified mechanic. While several hundred car-loans have been disbursed, program referrals exceed program resources. Loan default rates were somewhat improved by offering incentives such as free oil changes for consecutive months of timely payments. (Vivian, 2004). Another strategy to reduce defaults was enacted by Polk County Florida’s Citrus Cars that achieved a default rate of

6% by permitting cars that have been repossessed to be redeemed once (Wong, Ma & Hayden, 2003).

Auto ownership programs vary in size. The programs can be as large as Vehicles for Change operating in Baltimore, MD Richmond, VA and Washington DC regions, which awards between 45 to 60 vehicles every month, or as small as Minneapolis' Getting There with annual sales of 54 cars (Wong, et al. 2003).

Most the auto ownership programs rely upon donated vehicles from business and the general public and obtain funding for repairs and program administration from a wide variety of very diverse sources. Georgia's Wheels to Work is supported by \$10 million from a special state fund, which has permitted it to serve 1,600 clients with zero interest loans and no down payment (Wong, Ma & Hayden, 2003). In Minnesota, the church congregations conduct 'Car Sundays' by displaying the auto with balloons to raise funds and awareness for the auto ownership program, Getting There, from the collection plate during services, which aids in financing the 54 annual sales to low-income individuals (Wong, et al. 2003).

Other typical features of auto purchase and repair programs believed to enhance success rates are the preparation of a list of approved mechanics, and the offer of both assistance with auto insurance and gas vouchers for brief periods of financial instability. An important benefit of auto purchase programs is that successful participants establish a credit history.

Auto ownership promotion as the solution to transportation equity in the auto-centric designed communities within the United States is consistent with Sherraden's perspective. The benefits of private auto ownership are touted as an expanded range of access, improved travel flexibility and increased time saving, which translates to more hours available for market labor. However, in reality this excludes many individuals from the transportation solution, such as

children, those without sufficient financial resources, and the elderly or disabled, who are unable to own or operate a vehicle. In addition, there are serious questions of the sustainability, in terms of highway congestion, fuel consumption and environment degradation, related to transportation solutions that propose to indefinitely increase the number of vehicles on the roadways (Crawford, 2002).

7.2.2. Mobility Services

The benefits of mobility services, such as extended public transit are heralded as reduced congestion and pollution, and the lower up-front individual financial investment, which lend to its affordability to low-income populations. Social workers and other human service professionals have already made substantial progress in initiating a wide variety of mobility services. This has been greatly facilitated by the U.S. Department of Transportation's JARC program, which has been the most significant single source of funds for mobility services, investing \$375 million from 1999 to 2002 (Multisystems, 2003) and creating access to over 13,000 job sites (CTAA, 2002). User surveys indicate that approximately 68% of the JARC program riders could not access their work destinations without the services and 50% of the riders previously utilizing an alternative mode of transportation reaped time savings from JARC programs (Soot, Sriraj, & Thakuriah, 2002). Therefore, in light of the current study's findings, it is critical for social workers to advocate for continued and expanded support for JARC programs in this era when state and federal budgets are subject to reductions.

The non-ownership oriented JARC transportation projects can be divided into the two categories of fixed-route services and demand-response services. The demand-response services, which feature enhancements and supplements built on the existing fixed-route services, are the

most common initial transportation intervention targeted toward the disadvantaged, representing one or more activities of 93% of the early Job Access grantees (National Coalition for the Homeless, 2000) and approximately 72% of the current programs (Multisystems, 2003). These include expanding and improving fixed route services to include more early morning, late night and weekend services; and operating reverse commute routes and shuttle service to industrial parks and employer intense districts from existing transit hubs.

Demand response services have usually been designed to service women transitioning from public assistance to the workplace by meeting their mobility needs to critical but infrequent activities such as job interviews and employment training. Demand response riders tend to be more economically vulnerable, with fewer years of work experience and lower earning than fixed-route riders (Soot, 2002).

Other mobility services that have been successfully operated in the US include, van pooling or ride sharing; share-ride taxis; volunteer drivers; dial-a-ride, shuttle services; guaranteed ride home and a variety of para-transit programs (FTA & FHA, 2001). Some of the more innovative programs that have been implemented include collector routes that facilitate transfers between existing fixed route transit and the cross-utilization of vehicles such as school buses during off-peak hours (FTA & FHA, 2001).

7.2.3. Integrative Development

Both of the previous interventions are related to transporting people from where they live to their desired destination. Conversely, integrative development heralds the “era of staying in place” (Crawford, 2002) through a focus on eliminating the distance between where people live and their most frequent destinations.

This approach has a fundamentally different view of the problem from that of transportation to one of the geographic location of residence in relation to employers and other amenities. In essence, proponents of integrated development view sprawl and segregated housing as the primary issue. It is important to note that integrated community development represents a set of concepts and ideas about replacing sprawl with neighborhood-based alternatives, which is identified by many different terms, including but not limited to Traditional Neighborhood Development; New Urbanism; and Neotraditionalism (Duany, Zyberk & Speck, 2000).

Since integrated community development is a long-term solution directed toward eliminating rather than bridging the distance between people and the places to which they travel, this approach offers little immediate relief to transportation inequity. To achieve its objectives demands complex, multi-step, action plans, which require the participation of many community members besides social workers. Nevertheless, because it is an effective solution, which has been gaining in popularity and influence, the current discussion will introduce two of what may arguably be the most central components.

First, integrated development opposes the single-use zoning and the inflexible land use policies typical of the contemporary zoning code, which separates low, medium and high density housing, not to mention medical offices from general offices; restaurants from shopping establishments; and child care centers from employment sites. Instead it favors mixed land use, which blends commercial and residential properties, with green spaces, offices and public buildings (Duany et al, 2000). However, an important and often overlooked aspect of successful and socially-just integrated community development is the incorporation of housing for those with low and moderate incomes and the enforcement of anti-discrimination laws.

Second, integrated development tends to be more pedestrian centered than auto-centric. It is guided by a firm belief that there is something fundamentally wrong when the size of people's living spaces at work, home, and school are dwarfed by the space allocated to parking vehicles. Integrated planning vigorously opposes zoning regulations that appear to be written and enforced with the single objective of "making cars happy" (Duany, Zyberk & Speck, 2000). On the contrary, wide sidewalks, bike paths, high parking fees, traffic calming measures, and top-quality public transit are priorities placed before the needs of cars their drivers (Crawford, 2002).

Integrated community development may have the potential to be the most comprehensive and inclusive approach to transportation disadvantage. However, it is often charged with being an unrealistically expensive a venture. Nevertheless, proponents cite the current public investment in roads, water, sewer and other infrastructure in peripheral areas that have failed to keep pace investments in existing centers (Duany, 2000; Millar, 1998). Other economic factors include such things as the cost of impoverished public spaces, pollution from vehicles, damage to the social systems and ecosystems, lost time from travel and traffic congestion (Crawford, 2002). In addition, other champions of integrated development note the costs of health risks that extend beyond auto accidents to numerous chronic health problems linked to sprawl, which range from high blood pressure to breathing difficulties (RAND, 2004).

7.2.4. Conclusion

The current study examined the impact of the lack of vehicles on employment outcomes. There was a significant relationship between auto ownership and employment outcomes for all races, but particularly for African Americans. However, the social exclusion resulting from transportation disadvantage maintains restrictions from opportunities far beyond those of

employment. The United State's vehicle-dominated development patterns have also served to limit access to education, market places, health care, public services and recreational activities for those who do not own or are unable to operate automobiles.

It is widely recognized that there is no single solution to resolving the problem of transportation disadvantage. Effective transportation solutions are responsive to both the needs of the local clients and employers, consider the unique geography and resources of the regions they serve, and coordinate with and build upon the existing transportation services. In the current era of budget constraints, it is critical to make maximum use of the separate but extensive transportation networks that exist in all communities to achieve multiple program goals. This involves careful and collaborative planning and such planning for transportation assistance programs is a complex, multifaceted, and a continuous endeavor, which requires commitment, leadership and the dedication of significant resources (Coordinating Council on Access and Mobility, 2000).

Research to evaluate which intervention strategies are most effective is also required and will be addressed in the relevant subsequent section.

7.3. The Study's Primary Limitations

7.3.1. Threats to Measurement Validity

There are two substantial limitations to the current study's measure of vehicle ownership. First, the *Years Without Auto* measure reflects the respondent's position at a discrete point in a survey year. The participant's response to the vehicle ownership question, in any particular survey year, may not reflect their transportation advantage status throughout the entire year.

However, the stable proportion of the NLSY population reporting vehicle ownership throughout the period under examination, suggests that this may be a minimum concern.

Second, the NLSY survey question is actually worded as follows: “Do you or your spouse own any motor vehicles that are primarily for personal use, including cars, motorcycles, trucks, motor home or trailer?” Therefore, conceivably a respondent could reply in the affirmative to vehicle ownership, with reference to a motor home or trailer but not a vehicle to aid in their journey to work. Consequently, it is possible that autolessness is understated in the survey. On the other hand, although the question and this study’s control on marital status indirectly accounts for the impact of a spouses’ use/ownership of a vehicle, there is no such control for cohabiting participants. Cohabitation may be more prevalent among African Americans (Phillips & Sweeney, 2005), but the impact of cohabitation on the availability of a vehicle is unclear and unaddressed in the current study.

Another limitation in this study is an additional measurement issue related to the annual earnings variable. The current earnings variable renders \$20,000 in annual earnings in Pittsburgh, PA equivalent to \$20,000 in annual earnings in New York City. The current study lacks an economic index that could control for variance in the cost of living across the national sample. However, the study’s use of the *Residence* variable at least controlled for the cost of living variations in urban and rural geographic regions.

7.3.2. Threats to Internal Validity

Internal validity is established when the research can assure that it is the independent variable, rather than some alternative explanation, which causes the changes in the dependent variable. The degree of confidence in the validity of causal inference from correlational data is

much lower than that drawn from a well-designed experimental study (Mertler & Vannatta, 2001). Research related to urban women and transportation is not typically explored through strict experimental designs. Therefore, threats to internal validity are inherent in all studies of women and transportation because it is conducted in a real world setting, through a non-experimental design. So although causal inference can not be firmly established through this study, there is still value in demonstrating support for the proposed model that controlling for human capital, higher levels of transportation advantage among low income mothers is associated with improved economic outcomes.

In addition, there is a potential timing/directional problem among the variables in this study. Automobile ownership is not causally independent of positive employment outcomes, but the linkage between these two variables is unlikely to be simultaneous (Ong, 1996). This study's supplemental analysis of 175 cases that determined once stable auto ownership was achieved, earnings were significantly higher than during the periods of auto ownership instability attempted to address this issue. Future research could further specify the directionality by utilizing a similar analysis which examined the achievement and maintenance of a particular earnings threshold and then examine the years of auto ownership before and after achieving that threshold. This would permit an assessment of the relative strength of both these relationships to determine if there was stronger relationship from earnings to auto ownership; or from auto ownership to earnings.

Nonetheless, two recent studies have established the causal link between auto ownership and hours employed (Raphael & Rice, 2002; Ong, 2002), and past studies have demonstrated that low-income individuals, particularly welfare recipients, with the greatest employment and earning potential are most likely to become auto owners (Ong, 1996). Scholars in the

transportation/poverty arena have typically cited multiple studies, specifically from reverse commute programs, establishing that for low-income women transportation advantage is a precursor to accessing those wages that could then lead to auto ownership (Ong, 1996; Rosenbloom, 1992).

In addition, the current study's moderating model is less vulnerable to the direction difficulties. Although low wages could conceivably result in high autolessness, there is no logic why this inverse relationship between autolessness and employment outcomes is particularly strong among African Americans. Lower wages among African Americans would not logically be associated with a higher rate of autolessness than that experienced by white women or men. The logic fails further when considering why higher wages would be associated with lower rates of autolessness particularly among African Americans.

Therefore, there is a sound theoretical and conceptual reason for the study's guiding hypotheses, in spite of the fact that it is reasonable to consider that improved economic outcomes, the dependent variables, may have some predictive power in vehicle ownership. Nonetheless, there is value in exploring the transportation issues from both directions, especially in light of the magnitude of the literature suggesting that for this population, transportation difficulties present serious obstacles to economic stability. In addition, a pure causal model would require an experimental design and replicating past simulated causal models would require various unavailable data such as the national racial and geographic variations in auto insurance rates (Raphael & Rice, 2002; Ong, 2002).

7.3.3. Threats to External Validity

External validity refers to the researcher's ability to generalize the findings of their study to a broader population. The extent to which the above mentioned internal validity issues are problematic will impact the external validity of the study. Internal validity is a necessary component of external validity, although not the one and only sufficient condition for it (Rubin & Babbie, 2001).

In addition, the NLSY's cohort sampling technique places limitations on the generalizability of the results. It will be important to acknowledge that the findings in this study may not reflect the conditions of all age groups, but only those individuals born between 1957 and 1964. Also the extent of missing data on the central study variables, prohibit generalizations to the entire US population.

7.4. Recommendations for future research

The finding from this study, coupled with the previous research on transportation and work, presents a convincing case for the relationship between auto ownership and improved employment outcomes. Therefore, given that the need has been established for transportation assistance programs, the most critical need for research in this area of study is pertaining to the effectiveness of such programs.

Rigorous evaluation of transportation assistance programs is sparse. The evaluations that have been conducted primarily rely upon data collected from surveys of transportation assistance program administrators and clients, few of which are conducted by independent outside appraisers. The few independent evaluations that have been conducted have had to contend with low response rates and incomplete data, which has rendered the findings from such studies

inconclusive (Multisystems, 2003). In light of the findings of the impact of auto ownership on employment outcomes in this and prior studies, the assessment of transportation assistance programs is a critical function for social worker researchers.

A particularly critical first-step for research in the arena transportation assistance programs is the development of comparative goals and outcome measures; and the subsequent tracking of these program outcomes. In compliance with the Transportation Equity Act for the 21st Century, the United States General Accounting Office (GOA) was required to report to Congress on the implementation of the Job Access and Reverse Commute (JARC) Programs. In December 2002, the GOA reported on the failure of the US Department of Transportation (DOT) to evaluate the 352 JARC grants issued to over 42 states. (U.S. GOA, 2002). Subsequently the U.S. DOT attempted an evaluation effort based upon information from the Grantees Quarterly Report's electronically submitted information that provided reliable information on only 43% of the JARC projects. Findings indicated that although the targeted population is being reached, and transportation resources are being coordinated, there is a critical need for improvements in the evaluation process (Multisystems, 2003).

Case studies are the most frequently cited source of transportation assistance program effectiveness. Direct regional comparisons among the various transportation assistance programs utilizing a cost-benefit-analysis have not been conducted. Such analysis could utilize more sophisticated measures, such as increased employment and earnings, as well as increased collection of income tax revenues and savings from various assistance programs no longer required to support those unemployed due to transportation barriers.

In light of the Sherraden's theory and the current study's emphasis on the benefits of auto ownership, examining the role of an automobile as both an asset and a liability is another

important direction for future research. Insurance, repairs, gas, registration, parking, state inspections and other hidden costs of auto ownership could quickly lead to an unmanageable financial burden for low-income people and could even result in vehicle repossession. Ascertaining at what point the additional costs of auto ownership begin to dissipate the benefits of auto ownership, particularly for older model vehicles, warrants the serious attention of social work researchers.

Therefore, in the emerging field of transportation assistance program development, the limitations in the evaluation processes and the lack of standard measures and outcomes attest to a great need for community specific research (Lyons & Wilden, 2002). Creating and disseminating knowledge of best transportation program practices to administrators in the field permits access to vital information needed for replicating portions or entire programs to achieve the outcomes desired in one's own region.

8. References

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